UNDERSTANDING SCIENCE TEACHERS' PRAXIS:

An ethnographical study of science teaching in four Bangalore schools

A thesis submitted for the Degree of

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by

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Declaration

I hereby declare that the work presented in this thesis entitled, **Understanding Science Teachers' Praxis: An ethnographical study of science teaching in four Bangalore schools** has been carried out under the guidance of Prof. Padma M Sarangapani and has not formed the basis for the award of any other degree, diploma or fellowship previously. The particulars given in this thesis are true to the best of my knowledge and belief.

Place: Bangalore

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Date: _____ Indira Jayaram

Certificate

The research embodied in this thesis entitled **Understanding Science Teachers' Praxis: An ethnographical study of science teaching in four Bangalore schools** was conducted by Indira Jayaram in the School of Humanities, National Institute of Advanced Studies, Bangalore under the supervision and guidance of Prof. Padma M Sarangapani and advice and approval of the undersigned members of the Doctoral Committee. It is hereby certified that the thesis submitted is a bonafide record of research done by the candidate in fulfillment of the requirements for Ph.D. degree, and that the thesis has not previously formed the basis for the award to the candidate of any degree, diploma, associateship, fellowship or any other similar title of any other university or society.

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DEDICATION

This thesis is dedicated to my grandmother Saraswati Patti who at 99 years is eagerly looking forward to me receiving the doctorate degree. Patti has been a constant source of encouragement with her unflagging interest in my docotoral work. You are such an inspiration, Patti!

I also dedicate this work to the students of government schools with the hope that it may significantly change their experience of learning and doing science. Much work lies ahead...work to which I shall devote myself henceforth.

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CONTENTS

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ABSTRACT

The curriculum that is transacted is shaped by factors associated with the cultural and social location of the teacher and the taught. The present research was undertaken to understand science teacher praxis in schools catering to different groups of students to understand equity issues associated with science learning and achievement. Ethnography was conducted in four schools in Bangalore city: two government schools, one private unaided school, all affiliated to the Karnataka state board and one private unaided international school affiliated to an international board. 24 teachers participated in the study, and two groups of student-teachers were also observed and interviewed during their practice teaching over thirteen months of observation. Basil Bernstein's concept of the pedagogic device that mediates the social order through its distributive, regulative rules and evaluative rules, and the notion of education as a field, in which knowledge is recontextualised, provided the theoretical framework for analysis.

Government schools lacked adequate classroom space and laboratories, unlike private schools. The pedagogic processes followed in the three schools

within the official recontexutalisation field (ORF) of Karnataka state were similar, but the students in government schools received less classroom instruction. Teachers used the teachering device to draw students' attention to information from the textbook that was to be remembered and reproduced. The ORF in which the international school functioned differed from the other schools. Although the teachers in this school also used textbooks for teaching (discussed in Chapter 5), they did not give notes and did not drill students in recalling answers to questions. Teachers in this school did not read and paraphrase information from the textbooks as teachers in the government schools did. Thus the ORF lead to different classroom processes in PI as its evaluative rules did not emphasize students' ability to recall knowledge. The ORFs in all the schools legitimated knowledge that had been formally validated and consequentially the knowledge available with the working class communities to which students in the government schools belonged, did not find a place in the pedagogic discourse within their classrooms.

The pedagogic discourse in the classroom is not solely determined by the ORF but is also a result of the pedagogic recontextualization field, the PRF, whose agents are teachers. The observations of teacher preparation programmes in the course of this study have shown that these are insulated and discordant with the ORF as articulated in the National Curriculum Framework. In the PRF, the regulative discourse of the classroom supports teacher lead didactic praxis that is focused on delivery of textbook content and

transmits evaluative criteria that encourage students to reproduce this content without requiring them to display a deeper understanding of scientific concepts and their application to the everyday world. There is a pedagogical culture that supports intersubjectively the notion of the teacher as a transmitter of knowledge. Bernstein has argued that successful learning depends to a great extent on the weak framing of pacing-that is, on conditions where children have some control over the time of their acquisition. For that reason, only those children who have access to a second site of acquisition (the family) have been likely to succeed. The tight framing of pacing across the schools meant that the availability of family support played a decisive role in student success. This was reiterated by the science teachers.

The interaction of different ORF with teachers' personal biographies seems to engender the dispositions or habitus of teachers, who are agents within the PRF. The primary teaching habitus of pre-service teachers has been shaped by the twelve or more years of schooling where they have been enculturated into what constitutes appropriate ways of being within that context. Teachers' habitus lead them to work within ORF that more or less matched the ORF in which they had studied and thus government school teachers had invariably studied in government schools and private school teachers had studied in private schools. The pre-service colleges of education supported the tendency of teachers' to maintain their habitus by sending student-teachers to do their practicum in schools that functioned in the ORF

similar to the ones in which they had studied in. Student teachers' notions of what constitutes effective teaching and their notions about the relationship between children's socio-economic backgrounds and school achievement were not called to question during their practice teaching allowing the perpetuation of popular stereo-types about individual student's ability being the main determinant to his or her success in school. As a result of this, the PRF of the teacher education colleges and that of schools under the state board supported a reproductive habitus, where the teachers felt constrained by their circumstances, took their social world for granted and confined possibilities to those they saw as suitable for the social group they belonged.

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1 INTRODUCTION

Science education in India is confronted with three problems. The first problem is that science education is far from achieving the goal of equity as enshrined in the constitution of India. The second problem is that even the best science education in India develops competence, but does not encourage inventiveness and creativity. Thirdly, the examination system does not evaluate the competencies that are needed for understanding and producing scientific knowledge (NCERT, 2005).

1.1 EQUITY IN SCIENCE EDUCATION

Achievement in science is of special concern from the perspective of national development. Several research studies have shown correlations between school-level achievement in science and the economic development of a nation (Walberg, 1989; Benavot, 1992). Nations everywhere have allocated substantial amounts of instructional time to mathematics and science, two subject areas thought to have the greatest relevance to economic and technological development. “Most educational researchers, if asked to evaluate the relative economic value of particular subject areas, would undoubtedly rank mathematics and science education near the top” (Benavot, 1992). In countries like Chile, Kenya and Nepal, pilot studies have shown that the quality of school attended predicted the status of students’ first jobs and

that cognitive skills developed in school predicted later success in the informal labour market.

Leaving apart Hungary, Japan easily topped internationally standardised tests of secondary school mathematics and science knowledge and understanding, and about 95 percent of the age-eligible students graduated from secondary schools in Japan (Walberg, 1991). Is it possible to assume that scientific knowledge acquired in primary and secondary education affects the subsequent acquisition of technical skills in employment and learning in science, technology, and engineering subjects in higher education? A sound basic understanding of science developed in the primary and secondary stages of schooling would presumably produce not only the foundations for further scientific study by specialists, but also a scientifically literate general population well-prepared to live in an age of science. Summarising several studies in this area, Walberg (1991) wrote that there was strong support for the generalisation that those who do well early tend also to do well later. This is likely to be especially true in the case of education and careers involving science and mathematics because they are academic subjects in which the opportunity to learn comes mainly, if not exclusively from schools. These subjects are also hierarchical in that advanced topics are difficult to learn before the basics are mastered. Students without a thorough grounding are likely to fall behind in learning advanced university courses or technical job skills. The empirical finding of the academically rich getting richer is referred

to as the Matthew effect (Merton 1968), from the biblical saying: “For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath” (Gospel according to Matthew, XXV, 29). Merton (1968) had noted this about the development of eminent scientists. This effect also appears to characterise school and learning (Bloom, 1976, Haertel & Walberg, 1981, Walberg & Tsai, 1983). An illustration of the Matthew effect is provided by researchers who observed and tested Japanese, Taiwanese, and U.S. students in primary school mathematics classes. All three groups were equally able at the start of schooling. Each year, the Asian students showed greater achievement gains and by the fifth grade, the worst Asian class in the sample exceeded the best American class (Stevenson, Lee, and Stigler’s 1986). Similar studies are not available in the Indian context.

Literature on science education indicates widespread concern, across several countries, about the low achievement and participation in science of students from low socio-economic groups, involuntary minority and other disadvantaged groups, including women (Steinkamp & Maehr, 1983; Chanana,1993; Barton, 1998; Barton & Yang 2000; Lee, 2003; Fensham, 2004) . Several analyses of these findings argue that the difference between the culture of science and the home culture of students poses barriers for student achievement in science (Aikenhead, 1996; Cobern and Aikenhead 1998; Jegede et al 1996, Jegede 1997; Jegede and Aikenhead, 1999; Phelan et

al 1991; Pickering 1992).The culture of science is unquestionably accepted as universal, modern and originating in the West in these analyses and the problem for science education seems to be one of creating suitable paths for a student to enter this culture.

School learning, like learning elsewhere, may be said to be mediated by culture, and taking place in a social context (Mead, 1964; Vygotsky, 1978). This is true not only of subjects such as language and social studies where the subject content and concepts are intrinsically socio-cultural in their character, but also in areas such as mathematics and science which are believed to be of a more general and universal nature. Several studies have shown that the social context of learning and also the learner's socio-cultural background is of primary importance in the context of science learning in the school (Lee, 2003, 2005, Hogan & Corey 2001, Barton &Yang 2000, Sorge etal 2000, Chanana 1993).

1.2 CURRICULUM AND CONTEXT

The dilemma of whether science curriculum should enable all children to become scientifically literate or whether it should enable only selected students to take up science has been present ever since one of the first formal science curricula was written in 1867 by a subcommittee of the British Association for the Advancement of science. The two somewhat oppositional approaches to the school science curriculum may be classified as the "humanistic-cultural" approach and the traditional approach. The humanistic-

cultural approach promotes practical utility, human values, and a connectedness with personal and societal issues to achieve both inclusiveness and student –centred orientation, whereas the traditional vision that was promoted by professional science associations (such as BAAS) and emphasizes the rigours of mental training and academic screening to achieve both exclusiveness and a scientist-centred orientation. The humanistic-cultural approach to teaching science arises from a particular vision of school science but is motivated by evidence of failures of the traditional approach to teaching science: crises in student enrolment, myths conveyed to students and a ubiquitous failure of school science content to have meaning for most students, especially outside of school (Aikenhead, 2004).

The curriculum is a key component of school education. It can be divided into the intended and the enacted curricula (Stenhouse, 1975, Cornbleth 1990, Ball & Cohen 1996). The conceptual distinction between the intended and enacted curriculum assists us in distinguishing two approaches to studying the process and praxis of curricular interactions in the context of school classrooms. The intended curriculum consists of the official curricular documents where the aims, objectives, competencies and content of what is to be taught at the different stages of school are laid out. This defines the content to be learned and the structure, sequence, and presentation of that content and is created by national guidelines, by national or state education boards and syllabi, and by publishers of instructional materials. This curriculum is

interpreted by teachers, administrators, parents, and students to create the enacted curriculum, the one that is actually transacted and experienced in the classrooms. The enacted curriculum is the totality of the opportunities to learn experienced by the students and differs from the intended curriculum because it is mediated by the teacher, the students, the available instructional materials, and the learning environment. Thus, the curriculum that is transacted is to a larger or smaller extent shaped by factors associated with the culture in which the teaching and learning occur and the cultural location of the teacher and the taught as demonstrated in the Indian case by studies such as Sarangapani, 2003 and Clarke 2001. These studies also suggest that the teachers' 'models' of the situation play a very significant role in determining their practice. A study in rural Karnataka, India (Anitha, 2005) showed how teachers with negative attitudes about students also used indifferent teaching strategies in their classrooms. Efforts at curriculum reform that do not reflect teachers' models can lead to disjunctures between the expectations of the various agents involved in science education. Therefore, it is important to study and understand the actual classroom praxis of teachers.

The official curriculum is constituted by what Bernstein (2000) theorised as the Official Recontextualisation Field – ORF, of the pedagogic device. The ORF is created by the state and its selected agents and ministries. The curriculum transactions within school classrooms can similarly be said to be constituted by the Pedagogic Recontextualisation Field – PRF (Bernstein,

2000). The PRF includes teachers in schools and colleges and departments of education. While national curricula may give a clear direction to schools and teachers regarding teaching science, the processes through which curricula get transformed into classroom teaching is not so straightforward (Atkin & Black, 2003). The national curriculum is interpreted at various levels and these interpretations exert their influences on what students experience and learn in their classrooms. The interpretations and subsequent enactments of the curriculum occur in the sites of action – such as classrooms, where participants have shared understandings of concepts and ideas due to shared social contexts. Classroom processes are influenced by a multiplicity of factors including the national curriculum policy statements, curriculum support materials such as textbooks, government educational support services including provision of professional development for teachers, school and community aspirations for the education of students, evaluation procedures and finally teachers' beliefs and values about teaching and learning (Hargreaves & Fullan, 1992).

In addition to these multiple influences, the cognitive, social and language processes that occur within the classroom also impact on the curriculum experienced by the students.

Classroom processes are also influenced by the context of the schools in which they are situated and by the socio-economic backgrounds of the students who attend the schools. These processes in turn affect the achievement of students

in different school subjects. In Karnataka, like in other parts of India, there are broadly three categories of schools – the state supported schools (commonly referred to as government schools), the private schools that receive state support to varying degrees (private aided schools) and private unaided schools that receive no state support. There is considerable heterogeneity among the private schools which spans the entire range of socio-economic categories in India as well as diverse religious and ethnic groups. Private schools are privately owned and funded, and rely more or less on user finance, unless they are schools which run on philanthropic basis. Annual fees charged by private unaided schools could range from Rs.300 to Rs.100, 000 or more, thus showing that they cover the entire socio-economic spectrum. Some of the private schools now offer curricula for the British Cambridge International Examinations (CIE) or the French International Baccalaureate (IB) examinations and are referred to as international schools. These schools cater to the most affluent sections of students.

When growth in enrolments in different school types is analysed over time, it appears that in urban India the growing demand for schooling has largely been catered to by the private unaided schools, based on an analyses of data from the various educational surveys conducted by the National Council of Educational Research and Training (NCERT) between 1973 and 1993 (De et al, 2002: p.134). The different types of schools are not equally accessed by students of different socio-economic status. Disaggregation by caste, region,

and gender indicates biases in the clientele of private schools. “Private (unaided) schools are more for boys, for upper castes, and for urban areas than government schools. In other words, attending a private school is likely to be a mark of social privilege.” (De et al., 2002: p. 136). Other studies also support this finding. A study in Andhra Pradesh, for example showed that private unaided schools in an educationally backward district are biased towards more privileged groups and that less than 10 percent of poor families have their children in private schools as against 30 percent of middle income families and 45 percent of well to do families (Krishnaji, 1996). Bashir (1994) in her study of enrolment in private and government schools in rural and urban Tamil Nadu found that in both urban and rural areas less than 10 percent of students in private unaided schools were schedule caste (SC). 85 percent of the students in private unaided schools had both parents educated. In government schools 26 percent of students in rural areas and 42 percent in urban areas were SC. In such schools 30 percent of the fathers and 60 percent of the mothers were illiterate. Interestingly, the private aided schools had a student profile similar to those of government schools (Bashir, 1994). The male bias in the enrolment into private unaided schools is also shown by studies – Dreze & Gazdar (1997) and Majumdar & Vaidyanathan (1994). In the case of primary and upper primary schools, when pupil enrolment is considered for separate groups widely divergent realities show up within the educational system. “To take two extreme cases, a rural, female, SC/ST student of Indian and an urban,

male, ‘forward’ caste student of the same country seem to inhabit two different “worlds” of education. Only about 2 percent of the former category are taught in private unaided schools, whereas about 31 percent of the latter sub-group are catered to by the fee-levying school sector.” (De et al., 2002: p.136)

Coming to an understanding of the quality of education in different types of schools is not straightforward and cannot be arrived at simplistically. However, the examination performance of pupils in private schools is markedly better than that of pupils in government schools. Govinda and Varghese (1993) found that after controlling for student background, performance of students in private unaided schoos was higher than that of pupils in the government or private aided schools. Bashir (1994) found that children in standard IV, private schools were at least functionally literate and able to answer a few questions involving simple comprehensions skills whereas a large number of government school students had not attained even this level of language development.

In Karnataka, the pass percentage in the Secondary School Leaving Certificate (SSLC) examinations in government schools is approximately 10 percentage points lower than those of private schools. The percentage of students in government schools who passed the SSLC examination in 2006 was 65 percent and the percentage of students from private unaided schools who passed in the same year was 77 percent. For the year 2007, the figures

were 70 percent and 80 percent respectively. The trend has been similar in the other years also. According to the statistics published by the Karnataka Secondary Education Examination Board, for the years 2005, 2006 and 2007, mathematics has the lowest pass percentage followed by science. Achievement in these two subjects determines entry into the much sought after engineering and technology courses and these have been, "highly selective in terms of providing social access to the disadvantaged section of society" (Rao, 2006). The overall picture that emerges from the various studies and statistics shows that in urban areas children from disadvantaged groups are likely to be concentrated in government schools. The average student achievement in these schools was lower than those of private schools. Studies on the comparative quality of private and public schools (Govinda &Verghese, 1993; Kingdon, 1996) have corrected for student backgrounds in the process of analysing the reasons for the poor performance of government schools. The reasons for the underachievement of students from poor socio-economic backgrounds even in cases when school factors could be said to be broadly similar, has not been explored in these macro-level studies.

Macro-level data on the infrastructure facilities of private unaided schools indicate that they are better provisioned in terms of availability of drinking water and toilets. However, this by itself would be an inadequate explanation for the poor educational outcomes for children from the disadvantaged sections who also happen to disproportionately attend

government schools. NCERT (1998) survey results indicate that teachers in government and private schools are similar in qualification and training. Even the student-teacher ratios in the school types are comparable. In the absence of qualitative data, it is difficult to come to an understanding of how classroom teaching processes impact on student outcomes. In terms of outcomes for science, quality is bad too. International comparison of achievement among school-going 14-year-olds across 25 high- and low-income countries, using IEA (International Association for the Evaluation of Educational Achievement) data collected in the early 1970s, showed that the mean science test score of Indian students was the second lowest (Heyneman and Loxley 1983: p. 1174-5).

1.3 SCIENCE EDUCATION RESEARCH

Parallel to the two approaches to science curriculum outlined in the previous section, two broad research traditions in science education may be discerned – the socio-cultural traditon and the science education tradition. Each of these two traditions provides important insights into the nature of scientific literacy and the problems of helping students to achieve it in schools.

Both traditions share an understanding that science is much more than a body of knowledge or a set of methods for developing new knowledge. Both traditions share a view of science as a subculture with specialized language, values, and practices. Both traditions also share an understanding that the

"language of science" consists of more than words; it includes gestures, decisions about when to speak and when not to, equations, tables, graphs, and so forth—a semiotic system that people use to guide their actions and communicate meaning to one another.

The two traditions differ, however, in the kinds of actions and meanings that they emphasize. Broadly speaking, work in the science education tradition seeks understand how the language of science gives understanding and power with respect to the material world, to explicate the nature and limits of our understanding, and to explore how learners can come to share in that understanding. Thus a primary focus in this tradition is on how the language of science mediates our relationship with the material world.

In contrast, scholars in a socio-cultural tradition focus more on how the language of science mediates relationships among people. They view scientific communities as sharing what may be described as a *discourse*: a socially accepted association among ways of using language, of thinking, and of acting that can be used to identify oneself as a member of a socially meaningful group or "social network" Research in a socio-cultural tradition examines how scientific communities have developed their current prestige and power, how they include or exclude people, and how learners understand their relationships with the dominant discourse of science. Researchers in both traditions agree that our current teaching practices in school science help only

a small minority of students achieve scientific literacy, and that our society is poorer as a result.

1.4. SCOPE OF RESEARCH

The present research work can be said to lie within the socio-cultural tradition in science education research. The purpose of this research was to study the interaction between the curriculum, the students and the teachers in the context of science teaching in different types of schools with a view to understand how teachers constitute their role and how the pedagogy and culture of the classroom affects the learning of science among pupils from different social class backgrounds. It was an investigation of teacher praxis in different schools with a view to understand the role of teachers in maintaining or overcoming the disparity among students from different socio-economic backgrounds in terms of their participation and achievement in science.

This research enquired into the social construction of knowledge in the classroom. By treating as problematic, the teaching of science as a school subject and the praxis of teachers in the classroom and their construction of the learner, this research study hoped to understand the ways in which social stratifications were reproduced or countered within different types of schools – government, private unaided and international schools – in Bangalore. The common sense conceptions of the 'scientific' and the 'rational' together with the various social, political and educational beliefs that follow from them are

the dominant legitimising categories and thus have a taken-for-grantedness about them, which needs to be unravelled and examined (Young, 1971). Sociological enquiry treats these categories not as absolutes, but as socially constructed realities realised in particular institutional contexts.

The agencies or institutions, like curriculum authorities, education departments, teacher education colleges and schools may contest, that are strongly insulated from each other, maintain, and/or challenge the ordering/disordering principles of the pedagogic device. These agencies make up the fields of the pedagogic device. Bernstein's concept of field is similar to that proposed by Bourdieu (1992: p. 17), namely, a social space of conflict and competition, an arena 'in which participants vie to establish monopoly over the species of capital effective in it …. and the power to decree the hierarchy and 'conversion rates' between all forms of authority in the field of power'. In the course of struggles, the very shape and social divisions of the field becomes a central stake, because alterations to the relative worth and distribution of resources equate to modifications of the structure of the field (i.e., the social division of labour and the social relations within the field) (Singh, 2002).

Teachers and classroom activity are not often studied in research on education in India. Systems rather than people have been the main focus of educational research in India (Bhattacharjea, 1998). Sarangapani (2003) analysed the nature of teacher's authority in the school and found that apart

from the legal-rational authority accorded to teachers by virtue of their position within the school, there were other social dimensions to the role. In her ethnography of an Indian village school, Sarangapani found that the teacher-pupil relationship was multi-layered, with the curriculum-referred relationship being only one of several layers. The identities of teacher and student were elaborated beyond the modern institutional context of the school to include other dyadic relationships of adult-child, parent-offspring, *guru-shishya* and patron-protégé (Sarangapani 2003: p.109).

In the context of teaching science it is important to understand the nature of the relationship between canonical knowledge, curriculum and pedagogy. Teacher thinking and its relationship to effective teaching is not very well understood in the Indian context. More often than not, professional development workshops, and reform efforts focus on what teachers *should* be doing, rather than on teacher praxis - what teachers are already doing and the reasons for their actions . Studies of quality teaching attempt to identify external behaviours that can be transmitted to and adopted by other teachers end up by being prescriptive or inconclusive. In one such study, comparisons of the information gathered between least and most effective teachers were made. Many of the factors frequently used to differentiate among teachers did not provide any explanation of the differences between least and most effective teachers of science (Yager et al, 1988)

The position paper on teaching of science (NCERT, 2006) also has several recommendations for teachers, such as , "…teachers in particular have to be sensitive to the needs of these diverse groups of children" (p.38); " …a supportive relationship among students and teachers, student participation in setting goals and making decisions, clear expectations and responsibilities, and opportunities for collaboration, are some factors which lead to better student outcomes"(p. 13); "A good pedagogy must essentially be a judicious mix of approaches, with the inquiry approach being one of them." (p.15). As these curricular guidelines and prescriptions filter through individual teachers' minds, they are neither understood nor implemented in the same way by all teachers across different schools. Yet, even as individual differences among students receive mounting attention, individual differences among teachers are ignored. Because teachers thought processes occur inside their heads, they can't be measured, quantified, or standardized. They don't yield the data with which traditional researchers are accustomed to working. Failure to explore the influence of teacher thinking on the educational process cannot be excused because of its difficulty. Teacher thinking may, in fact, be the most important variable in the educational equation.

At the interpersonal level, specifically within the context of the classroom, the quality of teacher-student interaction and resulting patterns of learning are determined broadly by teacher expectation. Levels of expectation may be influenced by organisation or structural arrangements such as school

type. Additionally, other factors impinge on teacher expectation, including such factors as pre-dispositional personality traits of teachers; prejudices deriving from social ideologies that shape their perceptions of students; and educational concepts concerning IQ and cultural deficits of various groups of children. The cumulative effects of negative teacher expectation and treatment of pupils penetrate to the psychological level, thus lowering student motivation and achievement (Brophy, 1983, Rist,2000).

Banks, Leach and Moon (1990) provide a theoretical framework for understanding teacher's pedagogic knowledge. They posit a distinction between the terms knowledge, school knowledge and pedagogy. They draw upon three clusters of ideas: Shulman's curriculum oriented work (Shulman 1986; Shulman & Sykes, 1986), the cognitive approach of Gardner (1983; 1991) and the inter-related tradition of didactics and pedagogy in continental Europe (Verret, 1975, Chevellarde, 1991). Shulman's work is based on a theory of cognition that views knowledge as a contained, fixed and external body of information and views the work of teachers as one of transformation of this knowledge in ways that are accessible to pupils.

> " The key to distinguishing the knowledge base of teaching lies at the intersection of content and pedagogy, in the capacity of a teacher to transform the content knowledge he/she possesses into forms that are

pedagogically powerful and yet adaptive to the variations in ability and background presented by the students." (Shulman, 1987, p.15)

Gardner (1983) draws on Dewey and places discipline and domain at the core of pedagogy. His theory of multiple intelligences, is informed by the socio-cultural psychology of Bruner (1986; 1996) and emphasises student understanding. The work of Verret (1975) and Chevellard (1991) deals with the pedagogical perspective and deals with the concept of didactic transposition, a process by which subject knowledge is transformed into school knowledge. This concept is similar to the concept of the recontextualization of knowledge within educational institutions as theorized by Basil Bernstein (2000). Bernstein's theorization has strongly informed this research study.

The work of teachers has been examined along three axes, namely –

- Pedagogical perspective: Teacher' implicit and explicit understandings of the child as a learner and assumptions and beliefs about learning and teaching.
- Biographical perspective: Teachers' histories and personal trajectories including their own educational experiences in school and during initial teacher preparation programmes.
- Professional perspective: Assumptions about job/career, relations with epistemic communities, public legitimacy for

definition of the subject and methodology, significant others who reinforce the reality and institutional structure.

This research has thus looked at the shared and imposed meaning of school teachers and students in the science classroom, and possible congruences and discrepancies with non-school meaning and activities. The attempt was to understand what teaching and learning science meant to the teachers in the selected schools. In order to do this, it was necessary to probe into the explicit and implicit dimensions of teacher praxis. This research on teacher thinking sought to uncover teachers' conceptions and interpretations of various aspects of pedagogy, their choice of teaching and evaluation methods in the classroom, and the relationship between teachers' theories and their actions in the classroom (Clarke, 2001; Keddie, 1971; Thapan, 1991). Four schools of different types in Bangalore in Bangalore Urban North district were selected for a multisited ethnographic study. Within these schools, classrooms of teachers who taught science in standards VII, VIII and IX were observed over a period of 18 months.

1.5 ORGANIZATION OF RESEARCH FINDINGS

In Chapter 2, a contextual overview of the research problem that is concerned with the issue of differential achievement in science among students from different socio-economic backgrounds has been placed in the context of other

relevant research work. The theoretical framework that underpinned the research has been discussed and the reasons for the choice of critical ethnography as a method have been presented. In this chapter, an attempt has also been made to analyse the methodological and ideological approaches that have guided the various strands of research in the area of school effectiveness. The last section of the second chapter offers a description of the actual processes used during the field work and includes a brief note about how the qualitative data was handled to allow for themes to emerge. The themes that emerged from the data inform the chapters that follow this chapter. The findings from the field work have been organised into three chapters according to the focus of analyses of each chapter.

"Although policymakers and researchers alike have often portrayed teaching as a generic enterprise, school- teaching is not school-teaching is not school-teaching" (Grossman & Stodolsky, 1994). The work of teaching depends on the specific grade level; the subject matter; the school's organisation, mission, culture, and location; and the district, state, and national contexts in which teaching and learning occur. Since the objective of the present study was to understand the work of science teachers working in different types of schools with specific reference to the differential achievement of students from different socio-economic classes, it became necessary to examine the institutional context in which different teachers carried out their tasks. Chapter 3 offers a descriptive analysis of the four

schools that were studied for this research. This chapter tries to present a vivid picture of the different schools as spaces where teachers come daily to carry out their tasks, by describing the sights and sounds one might encounter in them. Details of each school in terms of number and class origin of the students, infrastructure and achievement are also included in order to complete the picture. A glimpse of the typical day in each school has also been included in the description.

Chapter 4 attempts to foreground science teachers as the agents in the pedagogic recontexutalising field. This chapter provides a multi-faceted view of the science teachers who participated in the study by looking at their biographies and self-defined roles and beliefs within the institutional setting of the school. While Chapter 2 had placed the work of teachers within the framework of Bernstein's theories, chapter 4 on teachers, steps out of this frame and offers a description of teacher's work as seen through their own eyes. Since teachers are among the significant but under-researched agents of pedagogical discourse and practice, an attempt has been made to give a description of who the teachers are, their work contexts and their beliefs and practices. The purpose of this is not to present cause and effect relationships between teacher biographies, beliefs and praxis. What is offered instead is an illustrative account of the work contexts, stated beliefs and observed practices of teachers. In the course of presenting brief biographies of the science teachers, attention is drawn to the differences in the backgrounds of teachers

teaching in different types of schools. The similarities and differences among teachers' reasons for taking up the profession and the differences in their work environments are also discussed in the chapter. Finally, the chapter presents comparative analyses of teachers' notions about students and their backgrounds in connection with student achievement in science.

The fifth chapter deals with the classroom processes. An attempt has been made to offer a descriptive portrait of classroom practices in the four different schools that were the sites of ethnographic observation. Basil Bernstein's formulations about the pedagogic discourse can help us to understand the question of the relative autonomy of the school and of the 'class belongingness' of its cultural dynamics (Apple, 2002). Similarities as well as differences seen in the different schools that were part of this research can help us to understand the different ways in which students, teachers and curriculum are positioned within different types of schools**.**

This chapter is organised in such a way as to bring out the regulative and instructional discourse within the science classrooms. The description of science teaching has been placed in the context of general teaching practices that constitute the regulative discourse of the classroom. Comparisons between schools and teachers are attempted to better understand the common features of the pedagogic discourse as it operates within the classrooms of different schools and also to analyse differences in the pedagogic discourse in the different classrooms. By presenting the similarities in some aspects of

teachers' work across the schools, this chapter makes an argument for the relative autonomy of the pedagogical recontextualising field (PRF) as posited by Bernstein (2000). The differences in teaching across the schools that were also evident are shown to be a result of triangular interactions between the ORF, the PRF and the distributive rules of the pedagogic device (Bernstein, 2000). Attention is drawn, in this chapter, to the discursive organisation of school and classroom practices in the context of the different types of schools that formed the field of study.

The penultimate chapter of this thesis deals with teacher training as this constitutes an essential part of the pedagogic recontextualising field and brings out the tensions and conflicts between the official recontextualising field and the field of pedagogic recontextualisation. It has been suggested by Bernstein (2000: p. 28) that the pedagogic device provides the intrinsic grammar of the pedagogic discourse through three interrelated rules: distributive rules, recontextualising rules and evaluative rules. These are dealt with in some detail in chapters 3 and 4 while discussing observations about schools, teachers and classroom transactions. The recontextualisation rules of the pedagogic device are pertinent to chapter 6, which describes and analyses the observations about teacher preparation made serendipitously during the fieldwork. Recontextualising rules regulate the formation of specific pedagogic discourses. According to Bernstein, the pedagogic recontextualising field can have an effect on pedagogic discourse independently of the official

recontextualising field. This seems to suggest that there is a source of tension within the pedagogic discourse arising from the autonomy of the pedagogic recontextualising field. Teacher preparation programmes can be said to be constituents of the pedagogic recontextualising field and an understanding of these programmes can illuminate the contours of the pedagogic recontextualising field. An attempt therefore has been made in chapter 6 to understand the role of teacher preparation programmes in shaping the pedagogic practices that constitute the pedagogic recontextualisation field.

Chapter 7, the concluding chapter returns to the question of achievement in school science and crafts an explanation for the differential distribution of this achievement. The explanation so crafted highlights the structural factors responsible for the low achievement in science among pupils who come from disadvantaged backgrounds, without ignoring the role of individuals and institutions. The role of teachers is presented in a layered and nuanced way, highlighting the complex interplay of context, biography and culture that occurs within classrooms. The consequence of similar pedagogies for students in different schools, coming from different home backgrounds is not the same and this has been presented to show how school science failure is constructed. The notion of 'habitus' from Bourdieu (1977) has been explored in the context of teachers' biographies and the stability of the pedagogic practices in the face of repeated attempts at reform.

2 THEORETICAL FRAMEWORK AND METHODOLOGICAL CONSIDERATIONS

This chapter concerns the theoretical framework that guided the research and methods chosen for the study. To begin with, a contextual overview of the research problem has been attempted. The issue of differential achievement in science among students from different socio-economic backgrounds has been placed in the context of other relevant research studies in education. The theoretical framework for this study is presented after the contextual overview. Next, an attempt has been made to analyse the methodological and ideological approaches that have guided the various strands of research in the field, followed by an argumentation for the method chosen for the present research. Finally, the actual processes used during the fieldwork have been presented along with a brief description of the way the qualitative data was handled to allow for themes to emerge. A discussion of the key findings of the themes that emerged from the data are presented in the chapters that follow this one.

Several research studies from different countries have indicated that lack of participation in science-related courses after school is clustered among students coming from lower socio-economic backgrounds (Phelan et al., 1991; Chanana, 1993; Woolnough, 1994; Fullarton & Ainley, 2000; Weisskopf,

2004; Khan, 2005). In the context of the present study, the critical issue to be examined was the relation between classroom processes and the achievement in science of students from different socio-economic backgrounds in Bangalore. A recent study of schools across Karnataka (Kaul, 2001) showed that in government schools a much larger proportion of students were from lower socio-economic backgrounds as compared to private schools. Seventy-seven percent of students in government schools came from low SES backgrounds (families with a monthly income of less than Rs.1500). In private schools, only 14 percent of the students came from such poor households. Since schools differed significantly in terms of their student composition, for the purposes of the present study, it was necessary to examine the teaching of science across different school types in order to understand how pedagogy, context and teacher praxis interacted to produce differential science achievement amongst students from different socio-economic backgrounds. By investigating the pedagogic contexts, life-worlds and praxis of science teachers in different school types, an attempt has been made to understand the way in which social stratifications are reproduced or countered within different types of schools.

Teachers and classroom activity have not been extensively studied in Indian educational research (Clarke, 2001). Educational research in India that adopts a qualitative methodology is also not common (Choksi & Dyer, 1997). The dominant research themes have been that of school effectiveness research

using quantitative research methods. The positivist paradigm continues to dominate although some universities like Delhi University and the Maharaja Sayaji Rao University in Gujarat have begun to teach qualitative methods (Raina 2001). Analysing contributions to the *Indian Educational Review (IER),* it was noted that over the last three decades, survey, experimental methods and content analysis have constituted 85 percent of all studies, and that the 'preferred investigative methods have been those grounded in a quantitative, positivistic paradigm' (Raina 2001, p.120).

Recently, there has again been an upsurge in testing and quantifying student performance in order to show tangible gains in the learning of children hitherto neglected by the education system (Educational Initiatives, 2006; ASER, 2009). As Keddie (1971) discussed in her work, one consequence of the normative orientation of much sociology of education has been its definition of educational failure. Explanations of educational failure are most often given in terms of pupils' ethnic and social class antecedents (Sirin, 2005; Kingdon, 1996). Such explanations of educational failure rely on a concept of social pathology rather than one of cultural diversity. Keddie (1971) examined the processes by which educational deviants are created and their deviant identities maintained in the setting of classrooms. In conclusion, Keddie wrote, "Ability is an organising and unexamined concept for teachers whose categorisation of pupils on the grounds of ability derives largely from social class judgments of pupils' social, moral and intellectual behaviour. These

judgments are frequently confounded with what are held to be rational values of a general nature." Keddie's work examined the beliefs of teachers about different student abilities in a school that tracked students by observing classroom interactions and concluded that track A students achieved better because of the alignment of these students' behaviour with the beliefs and expectations of the teacher and not because of any objectively discernible difference in ability between themselves and students of tracks C or B. "Thus both the 'knowledge' the teacher has of his subject and the 'knowledge' he has of the pupil must be seen as variables in the organisation and evaluation of what counts as knowledge in the classroom. This may mean that when similar questions are asked by A and C pupils, they are categorised differently by the teacher. This is a consequence of the implied notion that A pupils can master subjects while C pupils cannot."

Research in India indicates that children from privileged home backgrounds attend more high resource schools with longer instruction times and are exposed to better quality teachers (Kingdon, 1998). The quality of schooling varies widely in most major Indian cities. In terms of inputs, the disparities are most conspicuous in physical facilities and teaching materials from high resource private schools with excellent facilities to single-teacher schools with no building, drinking water, toilets, blackboard, electricity, furniture, charts or library (GOI, 1985). Given these facts and the possibility that teacher characteristics and school organisation may also vary greatly, it is

expected that institutional influences on pupil achievement will be strong. Kingdon (1996) found that private unaided schools are better quality than government-funded schools and, similarly, Govinda and Varghese (1993) found that private schools are better quality than government schools. School effectiveness studies were reviewed to understand the broad contours of school-related effects on student achievement before undertaking the fine grained ethnographic work that provided the data for this research.

2.1 SCHOOL EFFECTIVENESS STUDIES

School effectiveness studies fall into two somewhat divided camps. One camp attempts to identify particular school inputs, including teaching practices that raise student achievement, in order to find universally applicable solutions that can be mandated by central agencies. The assumption is that the same instruction materials and pedagogical practices hold constant meaning in the eyes of teachers and children across diverse cultural settings. The other camp can be loosely termed as "classroom culture studies". Such studies focus on the implicitly modelled norms exercised in the classroom and how children are socialised to accept particular rules of participation and authority, linguistic norms, orientations toward achievement, and conceptions of merits and status (Fuller & Clarke, 1994).

2.1.1 PRODUCTION-FUNCTION STUDIES ON SCHOOL EFFECTIVENESS

The first camp can be called the production-function camp and Fuller & Clarke (1994) reviewed several studies that looked at empirical evidence from several developing countries. School effects that were fairly consistent across a variety of societies and local conditions have emerged in three major areas.

1. Textbooks and supplementary reading materials: IEA studies based on teacher surveys in Chile, India and Iran indicated textbook effects on science achievement. Work within primary schools continued to find positive achievement effects from the supply and utilisation of textbooks (Fuller & Clarke, 1994). Supplementary reading materials, pupil exercise books, the presence and utilisation of school libraries, were all significantly related to reading achievement in several countries (Fuller & Clarke, 1994). The effects within secondary schools were less consistent. "Quality, in general, often is higher and more uniform across Third World secondary schools, relative to primary schools. This raises the general issue of whether school effects may be less at the secondary level, particularly in education systems that remain highly selective and allow only a small proportion of youths into junior or senior secondary school" (Fuller & Clarke, 1994).
2. Teacher qualities: Studies from the US and Europe have shown the lack of effect on student achievement due to teacher training and social class background (Hanushek, 1989; Harbison & Hanushek, 1992).

However, studies in Latin America provide a contrast, and indicate that there is a significant influence of teachers' social class background in primary schools (Heyneman & Loxley, 1983). A more detailed discussion of the effects of teacher qualities on student achievement will be taken up in another section.

3. Instruction time and work demands placed on students**:** For young children, the length of academic programs appears to exert considerable influence (Brown & Saks, 1986). Broadly evidence from a variety of developing countries shows that even gross indicators of instructional time are consistently related to achievement (Heyneman & Loxley, 1983).

Studies on mathematics or science achievement have had a major influence on the inferences about school's aggregate effect in developing countries. Indeed, Heyneman and Loxley's (1983) oft-cited empirical findings from 29 countries, showing lower family effects in poorer countries, were based primarily on science achievement. School effects on reading seem to be much less consistent than those for science as shown by the early studies. More recently, Harbison and Hanushek (1992) found that teachers' subject-matter knowledge of mathematics was strongly related to children's mathematics achievement. Reading achievement in the school's official language suffered when children

spoke another language at home, a specific condition that affected the school's discrete influence (Elley, 1992, cited in Fuller & Clarke, 1994).

Heyneman and Loxley (1983) examined the influence of family background and school factors on pupils' science achievement from 16 developing and 13 industrialised countries. Various school attributes, such as the availability of textbooks and school libraries, teachers' school attainment and length of instructional programme were analysed as a block of school qualities. Science achievement scores were then regressed on indicators of pupils' social class (i.e., parents' occupational and educational status) and the block of school factors. For industrialised countries, variation in school factors explained small portions of variance in achievement, after controlling for parents' social class. However, in developing countries, the block of school factors explained significant portions of the variance in achievement. For instance, 27 percent of the variance in achievement among East Indian children was explained by differing levels of school quality; social class background explained just 3 percent (Heyneman & Loxley, 1983). In the 29 countries included in the study, a significant correlation ($r = .66$) was observed between a nation's wealth (GNP per capita) and the amount of variance explained by school factors. These findings apply specifically to achievement in science.

Data from the Heyneman and Loxley paper suggests that the poorer the country, the greater the impact of school and teacher quality on science

achievement. Following this work, the interconnection among social class reproduction, human capital production, and national economic development has become a widely investigated area of research. Two major streams of research have emerged. One stream is concerned about the social reproductive capacity of modern schooling through the production of human capital in terms of academic achievement. The second stream of comparative research examines how the nation-state has, with an increasingly political interest in human capital production among its citizens, become the chief provider of schooling over the past 100 years (Fuller & Rubinson, 1992).

More recent work by Baker et al. (2002) suggests that the Heyneman - Loxley (HL) effect has almost vanished as access to schooling has improved in developing countries. In their time, the studies identifying the HL effect serve to increase our understanding about the intersection of school quality, social class and economic development in modern society. Since then, a number of school effects studies in developing countries have, on the whole, indicated a fluid situation in the development of education and a possible historic change in the HL effect. The Baker study reassessed the resiliency of the HL effect using data from the Third International Mathematics and Science Study (TIMSS) conducted in the mid-1990s. Their analysis indicates that the HL effect had vanished. The level of national income in 1994 is not negatively associated with larger absolute school-resource effects or the size of school effects proportional to total variance explained. According to this

study which looked at data for 36 nations, among the low GDP nations, only Thailand retained the original HL effect, while poorer nations such as Romania, Lithuania, and Colombia have larger family effects than school effects. However, there is evidence, that the second part of the HL effect is present among these nations. The overall production of science achievement in schools from better off nations is higher than those of poorer nations. National income seems to continue to play a role in cross-national differences in the level of mathematics and science knowledge among cohorts of youth, but even this effect was weaker than that reported in the 1970s. The 1970s research analysis was restricted to school resources and the Baker study followed this constraint in order to retain the conditions for comparing. Since the early 1980s, other dimensions of schooling like curriculum and instructional quality have been included in school effects research. However, these do not affect the nature and direction of the first HL effect, namely, that in countries with an adequate spread of mass education, family socio-economic status is a stronger predictor of school achievement than school resource variables. Baker et. al. cite other single nation studies which also report a reverse of the earlier HL effect (Riddell, 1997). In conclusion, Baker et al (2002) state,

> "The shifting HL effect indicates the dynamic, symbiotic relationship between these two (family and school) institutions. A third powerful institution, the nation-state, with its increasing

> investment in formal education and its explicit attempts to produce more human capital as a national economic strategy, is part of this picture and changes the conditions under which the family and the school articulate achievement and status reproduction." (p. 310)

Several studies have consistently found that school factors do influence achievement at statistically significant levels (Fuller, 1987). Material school inputs were related to achievement in developing countries, but very few studies from the U.S. or Britain found any effects from the level of material inputs. Effects from the school's social organisation and teaching practices appeared to be stronger in these countries. In developing countries, however, simple inputs, especially those directly related to instructional processes, were consistently associated with higher achievement. Qualities of teachers were related to achievement, particularly years of tertiary education and teacher training. The teacher's own social class background and verbal proficiency also affected student achievement as studies from Latin America showed (Heyneman & Loxley, 1983).

In many developing countries, state policies held significant potential in actually touching the quality of instruction and achievement of students.

> "The basic availability of textbooks and reading materials, the quality of teacher preparation and selection, and even blunt ways of lengthening the instructional time are all empirically related to higher achievement. Yet the influence of these policy-manipulable inputs will likely diminish as overall school quality rises, a process clearly seen in much of east Asia and urban areas of Latin America" (Fuller & Clarke, 1994: p.134).

In general, school effects tend to be stronger for mathematics and science achievement and researchers state that this may be due to the "foreign-ness of these subjects" (Heyneman & Loxley, 1983; Fuller & Clarke, 1994; Aikenhead, 1996)

2.1.2 Studies of Classroom Culture

While the production-function studies have attempted to achieve a generalised understanding of the various factors that impinge upon school effectiveness, other studies have attempted to understand the processes within the classroom which is the site where school effects are produced/constructed. Stevens (2007) has reviewed research pertaining to educational inequality in English Secondary schools. As mentioned in the review, from the 1960s onward, some scholars started to investigate the effects of ability grouping in schools (sometimes called "tracking," "banding," or "setting") on the educational attainment of working-class children. Instead of merely looking at specific

characteristics of working-class families, the "differentiation-polarisation" theory holds internal school processes responsible for amplifying family background effects (Foster et al., 1996). The process of "differentiation" refers to the separation and ranking of pupils by teachers, according to mainly academic and behavioural standards (Ball, 1981; Hargreaves, 1967; Lacey, 1970). Differentiation informs pupils' school experiences by restricting pupils' access to higher status curricula, pedagogical styles, syllabi, and relational characteristics to those pupils perceived (and differentiated) by teachers as having high ability (Ball, 1981; Keddie, 1971). This process of differentiation is believed to disadvantage working-class pupils because they are overrepresented in lower ability groups because of the middle-class nature of school expectations (Ball, 1981; Hargreaves, 1967; Keddie, 1971; Lacey, 1970). "Polarisation" can follow as a pupil's response to differentiation and refers to the "process of sub-culture formation in which the school-dominated, normative culture is opposed by an alternative culture which I refer to as the anti-group culture" (Lacey, 1970: p. 57). As a result, through a process of self-fulfilling prophecy, working-class pupils live up to the (lower) expectations that (middle-class) teachers hold of them, and in response to these individual or collective notions of institutional failure, they develop disaffected sub-cultural attitudes (Willis, 1977). Inspired by developments in social anthropology, these scholars combined ethnographic observations with

qualitative interviewing and survey and socio-metric analytical techniques to study social relations in particular schools (Foster et al., 1996).

The schools in Karnataka did not have a system of "tracking" students on the basis of ability; however, as discussed earlier, government schools had a predominance of students from lower socio-economic backgrounds and on average had lower pass rates as compared to private schools. An ethnographic investigation of teachers' understanding and expectations of pupils' abilities across different schools was therefore taken up to see whether similar processes as those described elsewhere were operational within these classrooms.

In addition to understanding and interpreting the daily teaching practices of the teachers, the present study looked at the structuring of teacher action that occurred in the institutional setting of the school. The theoretical framework for this aspect of the study was concerned with the problem of how human agency interacted with social structure. While studying the culture of pedagogy of science teachers in particular institutional settings, one needed to look into the forces that shaped this. Cultural processes are intimately connected with social relations, especially with class and class formations, gender divisions, social relations and with age oppressions. Culture also involves power and helps to produce asymmetries in the abilities of individuals and social groups to define and realise their needs. Thirdly culture

is neither autonomous nor an externally determined field, but a site of social differences and struggles (Apple, 1988).

2.2 THEORIES OF CULTURAL TRANSMISSION

Bourdieu and Bernstein are notable among sociologists with a deep interest in cultural transmission. Their intellectual projects have a great degree of similarity. Many commentators and analysts equate the two quite explicitly (Atkinson, 1985: pp. 80-81, 181; Whitty, 1985: p. 32; Sadovnik, 1991: p.48). Bernstein's quest for understanding the micro processes of schooling led him to continue to pursue the avenue of inquiry developed in his articles "Class Pedagogies: Visible and Invisible" (1977b). In that article, Bernstein analysed the significant differences between two generic forms of educational transmission and suggested that the differences in the classification and framing rules of each pedagogic practice relate to social class position and assumptions of the families served by the schools. Classification refers to relations between categories regarding the social division of labour and is related to the distribution of power. Framing refers to the location of control over the rules of communication (Sadovnik, 1991). Bernstein showed that sociologists of education had to do the difficult empirical work of looking into the world of schools and of linking educational practices to the larger institutional, societal, and historical factors of which they are a part.

Basil Bernstein was perhaps best known for his theory on elaborated and restricted codes from the 1970s (Bernstein, 2000: p. 90). At that stage of his

work, Bernstein was preoccupied with showing relations between the division of labour and linguistic orientations among working-class and middle-class children. Broadly speaking, the theory explained that the linguistic code of working-class children was restricted (contextual) due to their connection with the field of physical production, whereas the code of middle-class children was elaborated (abstract) by virtue of their relation with the field of symbolic production. Because schools operate on the basis of the elaborated code, Bernstein was able to explain the systematic academic failing of working-class children. The code theory received a lot of criticism because of its touch of structuralism and determinism (Atkinson, 1995). It was (possibly wrongly) viewed as a d*eficit theory* with a bias against the working class and towards the middle class. In his later works, however, Bernstein's approach had changed towards representing a more dynamic view of the interplay between social structure and human conduct. The approach has been termed *constructivist structuralism* (Bourdieu, 1990) because the possibilities of social change from beneath — from the agency of humans and their local practice — are stressed more than earlier. Bernstein himself refers to the latter approach as a focus on the relation *in* the educational system as opposed to a focus on the relation *to* the educational system (Bernstein, 2000). The focus derives from an interest in the relative autonomy of the educational system — autonomy from, for example, the economic field of production or from the dominating principles of the state. Bernstein seeks to explain the conditions of

that autonomy, that is, the principles under which it functions. For that purpose he develops the concept of the *pedagogic device*. It can be compared to a relay or social grammar that works to distort external power relations or discourses when these are put to play in the educational system. Bernstein mentions that numerous studies have shown the role of education in reproducing inequalities such as class, gender, race and ethnicity (Bernstein mentions Pierre Bourdieu as one example), but not many studies have been able to explain how such reproduction processes are brought about. The pedagogic device as a concept tries to capture exactly those processes.

The pedagogic device is constituted by three interrelated rules: distributive rules, recontextualising rules and evaluative rules. Distributive rules refer to a distinction between two fundamentally different classes of knowledge: the unthinkable and the thinkable. The unthinkable knowledge, in modern societies, is associated with the knowledge production at the upper reaches of the educational system, that is, the universities, whereas the thinkable knowledge is associated with knowledge reproduction in primary and secondary schools. As such, the distributive rules prescribe the way in which power relations, forms of knowledge, and identities are managed and controlled at a macro level in the educational system.

At mezzo level, the recontextualising rules lay down the principles for how external power relations and discourses are recontextualised and turned into pedagogic discourse in a local context, for example, secondary school.

And finally, at micro level, the evaluative rules show the principles for turning pedagogic discourse into specific code modalities which again set the agenda for students' participation mode.

The approaches of Bernstein and Bourdieu share similarities, especially in their concern with how social structure, particularly social class, shapes educational phenomena (curriculum, pedagogy, teacher-student interaction and testing) and how these in turn reproduce social inequality. Bourdieu offered a theory that linked knowledge, power, socialisation and education. He did not simply explain patterns of inequality by using statistics or educational input-output data, but focused on the process through which cultural knowledge and style operate as carriers of social inequality. According to Bourdieu, it is through socialisation and education that relatively permanent cultural dispositions are internalised, these in turn, play the role of structuring individual and group behavior in ways that tend to reproduce existing class relations (Swartz, 1997) "Cultural Capital" is a central concept in Bourdieu's theory which enables him to analyse general cultural background, knowledge disposition, and skills as analogous to economic goods that are produced, distributed, and consumed by individuals and groups. Bourdieu pointed out the existence of unequal distribution of cultural capital among the social classes in levels of educational attainment and patterns of cultural consumption. For instance, most university diplomas are held in France, by individuals of upper class origins and very few are held by children

of farmers and factory workers. According to Swartz (1997) there are three themes recurring in Bourdieu's work. First, academic performance is linked to cultural background. Bourdieu finds that children's academic performance is more strongly related to parent's educational performance history than parent's occupational status.

Secondly, schooling does make a difference. The educational system "retranslates" the initial degree of educational opportunity and amount of inherited cultural capital into characteristically academic traits. The concept of 'capital' has enabled researchers to view culture as a resource – one that provides access to scarce rewards, is subject to monopolisation, and under certain conditions, may be transmitted from one generation to the next (Lareau & Weininger, 2003). Lareau & Weininger emphasise Bourdieu's reference to the capacity of a social class to "impose" advantageous standards of evaluation on the educational institution.

Finally, Bourdieu, systematically, relates the selective process of education to social-class structure without reducing this relationship to one of simple class determinism.

Swartz (1977) argues that because Bourdieu views educational transmission as a means of conveying status inequality, he looks to the structural features of curriculum, pedagogy, and evaluation for an explanation of this pattern. Bourdieu considers that the traditional program of humanist studies, which is used as a preparatory track or stream, for the entrance to the

university and to get in the elite professional school in France, is tangential to the kinds of skills needed in the job market. This curriculum can be appreciated only by students whose economic background assures them a professional security. Moreover, this program acts as a selection device in the sense that academic success in the humanities requires general cultural awareness and a refined and elegant style of language. Therefore, curriculum content and style offer advantages to those who possess the "educationally profitable linguistic capital" (Bourdieu & Passeron, 1977, p.116)

Bourdieu draws attention to the oral transmission of knowledge in formal lectures, which defines the traditional method of instruction. On the basis of this idea, Bourdieu makes the interesting observation that even the physical organisation of the French universities-lectures halls, amphitheaters, podiums rather than small seminar rooms or even libraries testifies to the pre-eminence of the spoken word. The formal lecture elevates the role of the professor as the legitimate transmitter of cultural goods. Therefore classroom knowledge in Bourdieu's opinion is not the outcome of negotiated meanings between students and teachers but rather the imposition of legitimate symbolic meanings by the instructor (Bourdieu & Passeron, 1977 p.120.)

Individuals are structurally located in a multidimensional social space that refers to the individual's access to a variety of resources, social ties, and social opportunities related to occupation, but also to age, gender, educational status, and so on. At the same time individual action is not completely

determined by their location. Individual action is described by Bourdieu as intuitive, strategising and innovative (Bourdieu, 1977)). A key concept in Bourdieu's conceptual strategy is that of habitus. Habitus refers to interpretive schema, that largely tacitly, tells us how the world works, how to evaluate things, and provides guidelines for action. The habitus is both a product of social structure and itself a structure generative of social practices that reproduces social structures. Each social fields has its own relatively autonomous logic, ascribes different values to forms of capital – economic, cultural, symbolic and social. Perhaps the overriding impulse of Bourdieu's work is to bring culture into the centre of sociology for the purpose of analysing the dynamics of social domination (Seidman, 1998).

Over the past 30 years, Bernstein developed this approach into a systematic analysis of pedagogic discourse and practices. First, he outlined a theory of pedagogic rules that examines the "intrinsic features which constitute and distinguish the specialised form of communication realised by the pedagogic discourse of education" (Bernstein, 1990 p. 165). Second, he related his theory of pedagogic discourse to a social-class base and applied it to the ongoing development of different educational practices.

Most commonly, Bernstein does not distinguish between the recontextualising rules and the pedagogic discourse; in fact, he considers them jointly as 'a principle for delocating a discourse, for relocating it, for refocusing it, according to its own principle' (Bernstein, 2000, p. 32).

Recontextualising rules — *and* pedagogic discourse — are thus described as ‘imaginary discourses’ with the purpose of ‘translating’ external discourses (Bernstein mentions physics and carpentry as examples) into pedagogic discourses which are, in their turn, directed at transmitting certain contents of knowledge to certain learners in certain ways (physics in school is not the same as, for example, physics in the university, and equally, carpentry is not the same as woodwork in a school context).

Analytically, it is possible to regard pedagogic discourse as constituted by two underlying discourses, namely an instructional discourse and a regulative discourse. Empirically, the two discourses are always intertwined into one pedagogic discourse, but theoretically, the instructional discourse is the one that ‘creates specialised skills and their relation to each other’, whereas the regulative discourse is the ‘moral discourse which creates order, relations and identity’ (Bernstein, 2000, p. 32). The instructional discourse is always embedded in the regulative discourse — it is *dominated* by it, that is — since the question of moral and social order, according to Bernstein, is more important than the question of sequencing, selecting and pacing a subject such as physics. Hence the rules for transmitting subjects in local school contexts are ‘social facts’ relying on definitions of character, manner, conduct, posture, etc., more than they are ‘natural facts’ relying on the intrinsic logic of the subjects themselves.

The institutional relationship between teachers and students is part of the regulative discourse of the classroom and the nature of this relationship has been discussed by Sarangapani (2003, p.117-121). According to the author, "the adult-child and parent-child authority patterns – tacit, informal and already established in the community – are carried over to the context of the school." In her study of government schooling in a North Indian village, Sarangapani found that the exercise of teachers' authority was a routine feature of all teacher-pupil interactions during classroom instruction. Kumar (2005), after describing how the traditional village teacher exercised authority over the pupils in pre-colonial times, goes on to give an account of the loss of teachers' autonomy over the content and pacing of the lessons under the colonial disposition. What is interesting is that Kumar (2005) maintains that despite a significant loss of epistemic authority under the colonial education system, the teacher continued to exercise authority over pupils within the classroom.

> "There, his link with old indigenous values and traditions remained intact. Colonisation and bureaucratisation of education could not exercise much influence on established beliefs and practices concerning the teacher-pupil relationship. The old Indian view of this relationship was based on the notion that the teacher is supreme, that he possesses knowledge, and that he knows best how to impart it. The

pupil's role was to be modest, obedient and receptive." (Kumar, 2005: p.88)

Educational writers like Peters (1966) and Oyler (1996) have brought out the double meaning of the English word "authority". Oyler (1996) distinguishes between "authority as process" and "authority as content". The first refers to the teachers' control over pupils, whereas the second refers to the expertise of the teacher over content. "… the two dimensions of teacher authority are intimately and crucially related. In moral terms, it is the content authority of the teacher and the system in which she works that provides the moral justification for the process authority invested in her by society. Conversely, it is through authority-as-process that the legitimated forms of knowledge continue to be legitimated. Thus, power is bound up with both kinds of authority." (Buzzelli &Johnston, 2002 p.58)

Bernstein's notion of the pedagogic device (discussed above) talks of two components of the pedagogic discourse - the regulatory discourse and the instructional discourse. The former is analogous to the teacher's process authority, the latter to the teacher's role as content authority. Bernstein (2000) points out the way these two discourses are inextricably combined into a single pedagogic discourse and the moral significance of the later discourse. The same relationship is reflected in Foucault's (1990) concept of *power/knowledge.* Like Bernstein, Foucault argues that legitimated forms of

knowledge and legitimated forms of power are essentially part of the same regulatory mechanism. Synthesising the works of diverse authors, Buzzelli & Johnston conclude that power relations are an inevitable and inescapable feature of classroom life. The question to be explored therefore is the nature of classroom power relationships and their consequence for students learning science and not the existence of these relationships.

The Position Paper on teaching of science states that supportive relationship among students and teachers, student participation in setting goals and making decisions, clear expectations and responsibilities, and opportunities for collaboration, are some factors which lead to better student outcomes (NCERT, 2006 p.3). Broadly, these factors could be said to constitute a pedagogy where the *framing* is weak or less visible (Bernstein, 2000). Framing refers to the nature of the control over: selection, sequencing, pacing and criteria for acquisition of the content and also the social base which makes this transmission possible. "Where framing is strong the transmitter has explicit control over selection, sequence, pacing, criteria and social base. Where framing is weak the acquirer has more *apparent control* over the communication and its social base (Bernstein, 2000, p.13). By investigating the work of science teachers across different classrooms in different schools it would be possible to see whether there was a difference in the framing of the pedagogic discourse leading to differential outcomes for students.

2.3 NOTE ON THE CHOICE OF RESEARCH METHOD

Research on teaching has been unevenly influenced by conceptions of culture and cultural transmission. In teacher education and literacy education research, newer feminist and postmodern ideas about culture seem to have affected some research; in other areas, such as mathematics and science education research, culture is rarely conceptualised, and ideas about it – old or new - do not seem to have affected the direction of reform (Margaret Eisenhart, 2001: p.209).

Multisited ethnographies would investigate the connections among sites that together make up an arena of social practice, such as the teaching of science as it is practiced in classes 7-10. Using a multisited design I would follow the teachers' work of teaching science as it is practised in classrooms, discussed in staffrooms, carried over in their conceptions of how homes should help children to study. The professionalisation of teaching as created in colleges of education and refracted through the training and mentoring of novice teachers and their interactions in schools would also be followed as also the work of the teacher as seen through the eyes of pupils and their parents.

Multisited design does put conventional ethnographic method at stake. In a multisited design, the "specialness" of one site is lost; what is gained is the ability to make connections among distinctive discourses and practices from site to site.

2.3.1 CRITICAL ETHNOGRAPHY AS METHODOLOGY

"Critical ethnography in the field of education is the result of the following dialectic: On one hand, critical ethnography has grown out of dissatisfaction with social accounts of "structures", like class, patriarchy, and racism in which real human actors never appear. On the other hand, it has grown out of dissatisfaction with the cultural accounts of human actors in which broad structural constraints like class, patriarchy, and racism never appear. Critical theorists in education have tended to view ethnographers as too atheoretical and neutral in their approach to research. Ethnographers have tended to view critical theorists as too theory driven and biased in their research"(Anderson, 1989). These debates in educational research reflect the critiques of dominant ideas and methodologies in the social sciences and humanities. Geertz's (1983) phrase "blurred genres" characterises the cross fertilisation of ideas that has occurred across disciplines, bringing with it new perspectives and new debates in educational research.

The political and intellectual ferment of the 1960s challenged the grand theories and methodological orthodoxy of a previous generation. In sociology the Parsonian notions of function and system equilibrium have been viewed by many as too ahistorical and apolitical to do justice to the richness and diversity of social life. In anthropology, analysis shifted away from taxonomic descriptions of behaviour and social structure toward thick descriptions and interpretations of symbol and meaning. In many fields, research methods tied

to the assumptions of a positivism borrowed from the natural sciences are increasingly viewed as incapable of providing conceptually sophisticated accounts of social reality (Anderson, 1989).

“At the same time the ethnography "movement" was beginning in education, "neo-Marxist" and feminist social theorists in other disciplines were producing works that soon would make their mark in educational discourse (Althusser, 1971; Bernstein, 1971; Bourdieu & Passeron, 1977; Braverman, 1974; Chodorow, 1978; de Beauvoir, l953;Foucault, l972;Freire, 1971;Genovese, 1974; Giddens, 1979; Gramsci, 1971; Habermas, 1975; Horkheimer, 1972; Jameson, 1971; Lacan, 1977; Lukacs, 1971; Marcuse, 1964; Millet, 1970; Oakley, 1972; Poulantzas, 1975;). This "critical" thrust would raise serious questions about the role of schools in the social and cultural reproduction of social classes, gender roles, and racial and ethnic prejudice.

The interpretivists' focus on human agency and local knowledge appealed greatly to many neo-Marxists and feminists who were trapped in the theoretical cul-de-sac of overdeterminism. Analyses of economic and patriarchal determinism were increasingly viewed as inadequate social explanations for persistent social class, race, and gender inequities. Bowles and Gintis's (1976) impressive structuralist account of the role of American schooling in social reproduction and the theoretical and epistemological critiques that followed it (Cohen & Rosenberg, 1977; Cole, 1983) was a

watershed. They accelerated the search for representations of social reality capable of providing social explanations sensitive to the complex relationship between human agency and social structure." (Anderson, 1989, p.251)

The British "new sociology" had already produced several prototypes for a dialectical representation of social structure and human agency (Willis 1977). Ethnography allowed Willis to view working-class adolescents who were his cultural informants as more than victims of "false-consciousness".

The ethnographer uses two primary means of data collection: looking and asking. What teacher's actions mean to them might be apparent from looking (observing the classroom), but often determining this will necessitate asking them by means of informal and formal interviewing. Asking may also be required to fill in gaps in observation arising due to the impossibility of being everywhere in the present and also because we cannot observe what has happened in the past. However, asking can be much more intrusive than watching and the ideal process would be a recursive process of observation and interviews in which, at each step along the way, insights gained by one method (either asking or looking) are followed up using the other method.

Edwards and Mercer (1993) had used video recording to examine classroom communication. The authors presented a study of education as the creation of shared understanding between teachers and pupils. In her field work, Thapan (1991) found classroom observation particularly useful in understanding interaction in a situated setting, but preferred not to use a tape-

recorder. She also eschewed using a set of pre-determined categories into which to 'fit' classroom behaviour. Access to teacher culture was obtained through talk and observation. Clarke (2001), in a study on teacher thinking, has used classroom observation, teacher interviews and discussions with teachers based on video-recorded lessons, thus asking them to reflect upon their lessons as viewed by the researcher. Sarangapani's (2003) ethnography on a village school used classroom observation, in addition to formal and informal interviews with children, teachers and other adults in the village.

The present study used qualitative research methods to gather data, essentially consisting of participant observational techniques (Erickson, 1998). The essential purposes of qualitative research are to document in detail the conduct of everyday events and to identify the meanings that those events have for those who participate in them and for those who witness them. This seems suited the nature of this study as its objective was to probe the beliefs and actions of teachers as they went about their quotidian duties. The emphasis here was on kinds of things that made a difference to the social environment of the classroom. Because social life is so contingent, the kind of prediction that is possible in the hard sciences is not attempted in interpretive qualitative research.

The ethnographic approach was chosen to study science teaching in four schools in Bangalore. In contrast to strategies that focus on collaborative research relationships or reflexive presentations as the means of correcting

conventional ethnography (that has been challenged from concerns about perspective and power) George Marcus (1995) has proposed what he calls "multisite ethnography".

Drawing upon such an understanding of classroom processes that had been developed by Keddie, this research attempted to uncover the 'knowledge' of the pupils held by teachers across different schools, to describe the pedagogical processes as practiced and understood by the teachers and finally to illustrate the biographical and institutional processes that constituted teacher praxis to a greater or lesser extent.

Following from the theorising of Bourdieu (1977) and Giddens (1979), this study did not take a purely phenomenological approach nor to subscribe to structural determinism. Giddens (ibid.) proposed agency and structure as simply different aspects of social practice and implied that the analytical distinction between the two is not a real distinction.

In order to understand how the culture of science and science learning functions in the social field of the school, the everyday world of science teachers as they went about their daily tasks was studied for this research. Similar to Thapan (1991), the primary concern was with the world of everyday life, which 'presents itself as a reality interpreted by men and subjectively meaningful to them as a coherent world' (Berger and Luckman, 1967: p. 33).

In trying to understand the habitus of science teachers their biographies, social class and training history will be examined as also the ethos of the school where they teach.

While drawing upon Bourdieu's theory of habitus to understand teacher praxis in various school settings, the study also drew upon conceptualisation of the pedagogic device by Bernstein to describe the classroom processes observed in the various schools.

This work can be said to be a critical ethnography because it does not follow a purely sociological approach and try to understand pedagogical action in terms of social structures and institutions. On the other hand it does not adopt an uncritical stance of merely describing pedagogical cultures in different school settings without reference to the social positioning of the various actors. "Critical ethnography begins with an ethical responsibility to address processes of unfairness or injustice within a particular lived domain." (Soyini Madison,2005:p.5) The critical ethnographer attempts to probe beneath the surface appearances and bring to light the underlying operations of power and control (Carspecken, 1996). I have drawn attention to the power relations that act both within the classroom and across schools. In keeping with the method of critical ethnography, the written account of fieldwork does not try to erase the presence of the researcher and explicitly refers to her positionality. The cultural explanation for school failure in science has been questioned and the objective of the research has been to make explicit the

ways in which structure and agency operate through individual teachers in different schools. The following chapters draw attention to the consequences of these processes for students studying in the different schools.

2.4 FIELDWORK

Because of its intensive nature, this study was necessarily limited in scope with respect to the number of schools and number of teachers that would be involved in the study. Four schools of different types (following the typology suggested by Clarke, 2001) in Bangalore Urban North district were selected for what may be called as a multi-sited ethnographic study. Within these schools, classrooms of 24 science teachers who taught science in standards VI, VIII and IX were observed periodically for eighteen months.

2.4.1 CHOICE OF SCHOOLS

Schools are differentiated according to type of management and economics, education goals, formal structures, openness to change, teaching staff, and social relations. Moreover, whether the schools are public and under state control, or private and accountable to their clients, contributes significantly to differential educational outcomes. The main objective of this research was to do a multi-site ethnographic study of science teaching in different types of schools in Bangalore with a view to understand how teachers constitute their role and how the pedagogy and culture of the classroom affects the learning of science among different pupils.

Since academic achievement, as evidenced by performance in the end of the school examinations, varies across different types of schools it was part of the research design for this study to select different types of schools in order to understand the similarities and differences in their epistemological culture . As discussed in the introductory chapter and also later in this chapter, government schools had lower pass percentages as well as lower average achievement in science and mathematics as compared to private schools. On the other end, the international schools, that could only be afforded by very affluent parents, had high achievement levels but these could not be directly compared with the other schools in the state since these schools followed a different curriculum and the students were examined by a national/international examination board rather than the state board. One of the points of inquiry for this research was possible differences in the pedagogical cultures in these different schools. Accordingly, four schools of different types were selected to do a multi-sited ethnographic study.

It was felt that observation of classroom teaching across private and government schools that followed the same curriculum might provide insights into teacher related differences in pedagogy and therefore a private unaided school with better than average achievement results in the X Standard public examination and two government schools with average achievement results were chosen for study. In order to see if there were any visible gendering of pedagogical cultures, one of the government schools chosen was a government

girls' high school. A highly resourced international school with an affluent student population was chosen in order to understand the possible range of variations in pedagogical cultures that could obtain within the same educational district.

All the schools chosen for the ethnographic study were in Bangalore North Urban district. The school sites chosen for the study were:

- A government co-educational school complex including high school and higher primary school
- A government girls' high school complex including a higher primary school in the complex
- A private unaided school
- A school affiliated to an All India board and also to the Cambridge International Examination Board.

Within each of the school time was spent in the staffroom and lunch areas, interacting informally with teachers and also recording the events and incidents as they occurred in the course of the school day. Semi- structured interviews with teachers were conducted.

Informal interactions with parents and students within the school premises and on some occasions en route to the school were also recorded at a later instance out of memory and were used to provide the context for the processes within the school. Conversations were held in English or Kannada but all recording was done in English.

2.4.2 SCHEDULE OF VISITS

To begin with, I chose not to go in with a fixed observation schedule to and opted instead to approach the school head, the teacher/s in charge and the concerned subject teacher in that order. From August 2006 to March 2007, I visited the four schools on a particular day of the week in rotation. In this way each school was visited at least once during the week. During a school visit I spent approximately 4 to 5 hours in the school and during this period I would observe classes, write detailed ethnographic notes, interact and converse with teachers in the staffroom and other settings and on several occasions take on the responsibility to manage a class or help the teacher with record keeping. I also had occasion to respond to teachers queries related to subject knowledge .School vacations occurred in the months of September 2006 and in April-May 2007 and again in September-October 2007. These vacations allowed time for consolidating the field notes, preparing for student colloquia and attending seminars during the field work period.

During the second part of my field work, from June 2007 till December 2007 a more focused methodology was adopted. Two sites, one government school complex and the private unaided school, were visited continuously for at least 4 working days each week. The government girls' high school complex and the international school were also visited in this period, but less intensively, with a frequency of four to six visits per month. Intensive immersion at the two sites enabled me to strengthen participatory

observation and develop a close rapport with the staff of the school by blending into the school environment. As a result I could observe the various activities apart from classroom teaching that were also part of the duties of a teacher. It also allowed me to become familiar with the administrative procedures and other interactions between students and staff. Close interaction with teachers at the different schools led to informal sharing of life histories with approximately 50 percent of the teachers' who were respondents in this research. The other teachers did not develop the degree of intimacy that allowed for this and I did not feel comfortable to carry conversations about their life histories beyond what was share during the formal interviews conducted with these teachers.

2.4.3 GETTING TO KNOW THE TEACHERS

In the course of field work at the four school sites, apart from observing the lessons taught by twenty four different science teachers, time was spent in the staffrooms talking with the teachers. At the government primary schools the head mistresses office was also a place where teachers gathered after lunch or on special occasions. I invariably was part of these informal gatherings. In all the schools, with the exception of the international school, lunch time was the time for informal interactions with teachers as lunch boxes were opened and conversation about food, families and work took place in a relaxed atmosphere. I also had occasion to accompany government school teachers as they were engaged in the following duties:

(i) going on an enrolment drive to a nearby labour colony;

(ii) verifying voters' list;

(iii) visiting a satellite school under a scheme where high school teachers mentored teachers in primary schools in the area;

(iv) escorting orphaned girls were back to their hostel when an unscheduled holiday for schools was declared.

Semi-structured interviews with all the 24 teachers were held on at least one occasion at a mutually convenient time. In some cases the interview was spread over two sessions. Only two interviews were taped and transcribed later. In all the other cases notes of the interview were taken down at the time of interview.

The interviews were based on the following set of questions:

- Could you describe your job as a teacher?
- What are your views about teaching?
- What do you like about this profession?
- Is teaching science different from teaching other subjects?
- Did you train for this job?
- What are your comments about training?
- Which aspects of training are most relevant to your job?
- What makes a good teacher?
- What made you choose this job?

- Did you consider other careers?
- How often do you go for in-service training programs or workshops?
- What do you feel about these programs?
- How does the school help you in your job?
- What kind of interactions do you have with your colleagues during school hours?
- Does the syllabus/text-book make a difference to your teaching?
- What would you like to say about students?
- Do all students do well? Who does? Who does not? Why?
- Do you have any plans for the future?
- Does your school need improvement? What do you suggest/
- How would you implement your suggestions?

Biographical details of each of the teachers were gathered using a form and tabulated separately. While inquiring about these, several teachers naturally moved into conversations about their life experiences and these were recorded. About half the teachers did not volunteer more than the brief biographical details that were asked for while filling in the form. Reciprocally, I was asked on several occasions about my own antecedents and I shared my biography with other participants in the research to the extent sought.

Apart from the formal semi-structured interviews, it was possible to have several informal conversations with the teachers during the course of

school visits. In some cases these conversations were recorded as they took place, but more often the conversations were recorded after they took place. Conversations during the staffroom provided rich insights into teachers' life-worlds an in order to maintain the naturalistic flow of talk; I did not always whip out my notebook and record these, especially in cases where I was participating in the conversation myself. Conversations that did not involve my direct participation, but that seemed relevant to the research work were noted in writing as they took place. Although conversations often took place in Kannada, the notes were always taken down in English. The teachers did not express discomfort about their talk being recorded in writing, but on a few occasions requested to see what I had written. On a few occasions, teachers or heads of schools requested to see what had been recorded and the notes were duly opened for scrutiny. Perusal of notes by the concerned teachers or heads of institution invariably resulted in a broad agreement that what was recorded was close to the actual event or conversation. *"You have just written down everything as it is"* was said by the headmaster of the private school after looking at the notes.

Informal interactions with parents and students within the school premises and on some occasions en route to the school were also noted down at a later instance out of memory and were used to provide the context for the processes within the school.

2.4.4 OBSERVING CLASSROOMS

The methods followed were those used in anthropological work. Video recording was not used since this would have entailed viewing the classroom through eyes, not my own and therefore opaque to analysis and reflection or alternately wielding the camera on my own, which would then necessarily have been constraining in terms of what was viewed. It was felt that video recording would be perceived as intrusive and lead to 'performances' in front of the camera.

I was positioned at the back of the classroom on a student bench for several of the classroom observation periods and recorded the transactions as they occurred in a notebook. On some occasions I deliberately chose to position myself at the head of a classroom, to one side so as to not obscure the students' view of the blackboard or their teacher. This vantage point afforded opportunities to observe student responses to the teaching and allowed me to view the classroom from the same side as the teacher.

In the case of the government school where the lesson transactions were in Kannada, notes were taken in English by a sort of instantaneous translation. Some words were recorded verbatim and later translated to provide the nearest English equivalent. Whenever it was possible, I had an interaction with the concerned teacher immediately after the lesson and was able to probe the teachers' explicit explanations for events or methods of teaching. On other instances teachers sought out my feedback on the lesson

and these instances also provided sources of information about teachers' beliefs and anxieties about their teaching.

In the selected schools, science classes in standards VI to X were observed. After obtaining the timetable of the various teachers and then gaining their consent, I would sit in on their classes and record the transaction and other details in writing. Whenever the talk was in Kannada, it was translat into English. In both the government schools physics and mathematics were taught by the same teachers, therefore mathematics classes were also observed. The following different classroom processes were observed on several occasions:

- Introduction of a new lesson/topic
- Note-giving
- Revision of previously taught lessons as preparation for test or exam
- Project-based lessons
- Laboratory classes
- Teacher demonstration of experiments
- Conduct of written test/exam
- Conduct of oral examinations
- Preparation for Karnataka State Quality Assurance Organisation (KSQAO) tests
- Additional/Special classes held after school hours
- Classrooms when the teacher is not present due to various reasons

- Classes taught by trainee teachers

Laboratory classes were also observed in all the schools. Classes conducted by the regular teachers as well as those taken by B.Ed trainees were observed in three of the schools. Implicit theories of teaching and learning held by teachers began to emerge from these observations. Invariably I took up one or two incidents/events relating to the observed class for discussion with the concerned teacher. On some occasions the teacher would directly seek an opinion or comment from me and on still other occasions the teacher would voluntarily offer an explanation, comment or analysis of an event that would have occurred during class. Such relatively informal and often brief interactions with teachers helped to delineate the explicit theories that underpin teacher practices. It was also possible to probe into the assumptions held by the teachers about the qualities of responses from pupils that indicated to the extent of learning that had taken place.

2.5 DATA HANDLING AND CODING

Classroom transactions, conversations and occurrences in the school were coded using a spreadsheet and this enabled the emergence of themes from the ethnographic data. These themes were then written up and analysed and formed the chapters of this research study.

Data was classified into three broad categories: classroom-related, conversations and incidents. For each of these categories a spreadsheet was

created that provided information on the date, school, classroom/other location, key actors and key points. All the notes pertaining to classroom transactions, conversations and description of incidents/events were then converted to the spreadsheets. After this it was possible to use the program to locate specific schools/actors, incident types or classroom types, conversation topics, or other points of interest as the analysis proceeded. Each entry on the spreadsheet also provided reference to the field notebook where the notes were recorded and allowed for cross-checking with the actual notes related to the coded data. In this way it was hoped to minimise loss of contextual detail in the process of coding.

Summary

The overview of the research problem in the context of the present study has been presented along with theoretical and methodological considerations. The choice of qualitative methods for this study has been justified on theoretical grounds as appropriate to answer the nature of the research question. The research question is concerned with understanding the role of teacher- praxis in the empirically observed differences in science achievement across schools in Bangalore which otherwise follow the same curriculum. The selection of the international school for this study was justified in terms of its potential for presenting the possible range of pedagogical practices that could obtain across schools situate within the same district, but catering to different sets of students. Finally a description of the actual methods used for field work and a

note on the handling of data was provided. The next chapter will attempt to offer a description of the different schools in terms of their student population, infrastructure and other significant features. The schools provide the institutional framework for pedagogical action and it was felt that teacher praxis must be understood within these frameworks.

3 THE SCHOOLS

This chapter provides the contextual details for the research and gives a description of the different types of schools in the study along different dimensions and draws out the implications of these differences. Two government school complexes, a private unaided school and an international school were studied as part of the research and the purpose of this section is to present the context in which teaching and learning occurred in these schools. In addition to a general description of each school, comparisons across schools are presented in terms of their infrastructure, pupil-teacher ratios, enrolment of girls and schedule caste children and academic achievements. The social stratification of students into the different schools, school-related factors affecting student outcomes, pupils' social back-grounds, their achievement in science and the culture and pedagogy of the schools are also discussed in this chapter.

Schools serve many social, economic and cultural purposes, from child minding to the development of a skilled workforce. But their institutional rationale is always their function of passing on a part of the accumulated knowledge of a society, and evaluating children's success in acquiring this knowledge (Edwards & Mercer, 1993). Educational knowledge, as represented by the school curriculum is a selection from all the knowledge of a particular culture. It is possibly 'an arbitrary selection, sanctioned only by

convenience and tradition' (Barnes, 1982). The school curriculum consists of more than the given 'facts'; it includes ways of operating in the world and of making judgments. When manifested ideally, the school curriculum embodies useful ways of evaluating given information, of generating new information and creating new ways of thinking about and acting upon, the world. At the opposite end of its functioning it can exclude valid knowledge of the disadvantaged sections of the society and thus remain peripheral to the lives of these people. Educational knowledge has no well-defined boundaries, and merges with other kinds of social understanding and experience that children acquire during their school years. The boundaries of educational knowledge are continuously marked out, and reinforced, in classroom discourse. Schools have their own pedagogical cultures. Since academic achievement, as evidenced by performance in the end of the school examinations, varies across different types of schools it was part of the research design for this study to select different types of schools in order to understand the similarities and differences in their epistemological culture . As discussed in the introductory chapter and also later in this chapter, government schools had lower pass percentages as well as lower average achievement in science and mathematics as compared to private schools. On the other end, the international schools, that could only be afforded by very affluent parents, had high achievement levels but these could not be directly compared with the other schools in the state since these schools followed a different curriculum and the students were

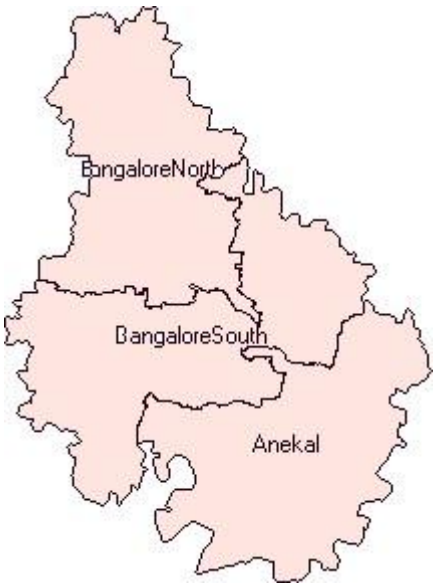
examined by a national/international examination board rather than the state board. One of the points of inquiry for this research was possible differences in the pedagogical cultures in these different schools. Accordingly, four schools of different types were selected to do a multi-sited ethnographic study.

3.1 LOCATION

All the schools chosen for the ethnographic study were in Bangalore North Urban district. Bangalore Urban is a district of the Indian state of Karnataka. Bangalore Urban district came into being in 1986, with the partition of the erstwhile Bangalore district into Bangalore Urban and Bangalore Rural districts. Bangalore Urban has three main taluks — Bangalore North, Bangalore South and Anekal. The city of Bangalore is situated in Bangalore Urban district. Bangalore Urban district has 17 hoblies, 668 villages and 9 municipal corporations.

The population stood at 6,537,124 of which 88.11percent was urban as of 2001. (http://www.censusindiamaps.net/page/India_WhizMap/IndiaMap.htm). The district supports about 9.41% of the state's total population and 27.41% of the total urban population of the state. The urban agglomeration is spread between North and South taluks of Bangalore covering an area of about 151 sq. km. with average population density of16, 399 individuals/sq.km. As per the 2001 census data, Bangalore urban had an overall female literacy of 77.5% and a

male literacy of 87.9%. The literacy figures for Bangalore North were 72.1% and 86.2% respectively.



Map source:

http://www.kssidc.kar.nic.in/karmap_files/bangalore%20urban.asp

At the time of the study, the city had 8,235 schools for both the primary and secondary level. The school structure in Bangalore according to ownership and management can be divided into the following six categories:

1) Educational Department Schools

2) Government Aided Schools

3) Private Unaided Schools

4) Schools under various local bodies

5) Social Welfare Department Schools

6) Schools under other educational boards

The educational classification of the primary and secondary schools in Bangalore is as given below:

Classification of Primary and Secondary education

Types of schools	Classes
Lower Primary	Class I to Class
Higher Primary	Class VI and Class VII
Secondary	Class VIII to Class X
Higher Secondary	Class XI and Class XII

In common terminology, government schools are those that are run by various departments like the Education department schools, the local body schools, schools run by the social welfare department schools and various other types of schools such as madrassas, Arabic schools and minority language schools.

At the time of the research study, Bangalore urban North had 514 government schools , and out of these 507 were run by the Education Department, 2 by Social Welfare Department and 5 by Local Bodies. There were 218 private aided schools out of which 27 were for Schedule Caste (SC) and 4 for Schedule Tribe (ST). There were no Madrassas or Arabic schools in this district. There were 861 private un-aided schools in Bangalore North. (http://schooleducation.kar.nic.in/schemis0607.html). This made a total of 1602 schools in this category in this area. Bangalore Urban South had 2,392 schools as per the EMIS data.

3.1.1 SELECTION OF SCHOOLS FOR THE RESEARCH STUDY

Four schools of different types were selected, keeping in mind the general typology of schools in Bangalore. The school sites chosen for the study were:

i. A government co-educational school complex including high school and higher primary school

ii. A government girls high school complex including a higher primary school in the complex

iii. A private unaided school

iv. A school affiliated to an All India board and also to the Cambridge International Examination Board.

Since the study was concerned with the teaching practices of science teachers, it was decided to study classroom processes in standards VII to X across different types of schools in Bangalore. These standards were chosen because science was taught as a separate school subject from standard VII onwards. From standard I to standard VI, science was integrated into the school subject called Environment Studies. Three of the schools were preparing students for the Secondary School Leaving Certificate (SSLC) examination conducted by the Karnataka Secondary Education Examination Board (KSEEB). Out of these three schools, two were Government schools and one was a private school. The fourth school chosen for study was a private international school.

In the case of the two government schools, standard VII was part of the higher primary school, whereas standards VIII, IX and X were part of the high school. Although the primary schools were located within the same compound as the high school, they functioned separately in terms of administration. There also appeared to be very little formal or informal interaction between the staff of the primary and high school.

3.2 DESCRIPTION OF SCHOOLS IN STUDY AREA

3.2.1 GOVERNMENT SCHOOL COMPLEX A

(Code: GA)

This school complex included a government model higher primary school and a government co-educational high school. The high school premise was also

the site for a Government First Grade College. The three institutions, namely the model higher primary school, the high school and the first grade college functioned autonomously in terms of administration despite being located within the same compound.

The school complex was located in one of the habitations of Bangalore Urban North District and had been in existence since 1949. The school compound, approximately an acre in extent was at the end of a street, appropriately named 'School Street'. Unlike the private unaided school, described subsequently, this school was located in an area surrounded by lower income houses. As one walked down the main Road, which branched off the high way one first came across several small shops and workshops that were part of another settlement. This road was in a very bad condition earlier and had recently been widened and re-surfaced. Small retailers, general merchants, tailors, watch repairers, scooter mechanics, pawnshops, welders, bicycle repair shops, hardware stores; tiny hotels, cloth merchants, shoe shops, beauty parlours, cyber cafes, pharmacists and butchers plied their trades on either side of a 300 meter stretch of road. The width of the road which was available for traffic had been considerably reduced by parked two-wheelers and vegetable vendors' trolleys. In between the shops one could also notice the entrance to "St Mary's English School". This private aided school consisted of a narrow two storey building standing between two small shops and had no playground.

After this stretch there was a moderately sized apartment complex on one side of the road and across the road was a residential layout developed by the Bangalore Development Authority. This area had two private unaided schools, one of which was also affiliated to the Council for Indian School Certificate Examinations (CISCE). The Council was established in 1958 by the University of Cambridge Local Examinations Syndicate to ensure that its examinations become adapted to the educational needs of the country and assign the ultimate control of the same on the Council. The Council was registered as a Society under the Societies Registration Act XXI of 1860 on 19 December, 1967. The other school, chosen for this study was also seeking affiliation from this board, but at present prepared students for the SSLC examinations conducted by the KSEEB. The areas surrounding both these schools were well laid out with large houses, parks, and a temple complex. Both schools used the civic amenities areas as playgrounds.

Further down the main road, there were a few retail stores belonging to one or other chains and two private land holdings, with areas of over an acre each. Beyond this, the road again went past a low income area with small houses built closely next to each other. A new government lower primary school had begun to function across the road from this settlement. Still further the road was once again bordered by shops, houses and hotels. There was a clear sense of contrast between the expansive feel of the road when it passed by the edge of the upper class residential layout and when it entered the low

income settlement. The road came to a circle with a small temple in the centre and then branched into four. One of the narrower branch roads, led to the Government co-educational school complex. One passed fairly modest sized houses, workshops and small box shops before reaching the school. The tar surface of this road was worn out in several places and the dirt underneath provided an uneven surface where water collected in puddles during the rainy season. The school was set in grounds of about an acre, surrounded by a low and partly broken down compound wall. Just before reaching the school one had to go past a large smelly drain. On one side of the drain stood an 'anganwadi', (government pre-school day care centre with its ramshackle door and broken windows). Often one noticed a row of little bare bottoms as one went past the anganwadi – this was during the morning recess, when the children as a group were allowed outside to relieve themselves on the side of the street. The children thus experienced a regulation of their bodily functions, and were at the same time socialised into a group that did things together and collectively regulated by the care-giver/teacher.

There were no gates at the entrance of the school compound. As one entered one could notice two ancient trees within the school compound. On one side of the compound was a grassy patch with bits of paper and other rubbish. Younger children used this area as an open air toilet, even though the school did have a girls' toilet. Very often one or two cows could be seen sitting in the shade of the trees in the compound. Just outside the school

compound was a tiny shop and children often came there to buy sweets and biscuits. There were also vendors just outside the school, selling guavas or cut green mangoes from baskets to the school children. Children ventured out of the school during the lunch break but not normally otherwise.

Children came to school usually dressed in the government issued uniforms consisting of deep blue skirt or pants and a lighter blue shirt. Children wore chappals or sandals to school and these were left in a row outside their classrooms, since they invariably sat on the floor. Teachers did not however, remove their footwear before entering the classrooms.

GOVERNMENT MODEL PRIMARY SCHOOL

(Code: GAP)

At the time of study, the primary school had strength of 603 with 287 boys and 316 girls and 12 teachers. There were 138 SC children and 35 ST children. The pupil teacher ratio worked out to about 50:1. Overall in Bangalore North Urban there were 41316 boys and 43450 girls studying in primary schools run by the Education Department. These children are taught by 2500 teachers and thus the average pupil teacher ratio for this district works out to be approximately 34:1. This indicated that this government model primary school (GAP) se had a significantly higher than average pupil teacher ratio..

The school consisted of a double row of classrooms. Standards VI and VII had two sections each and these along with the Head Mistress's office and the lunch room were located in the front row of classrooms, whereas the lower primary sections were housed in the row of classrooms behind. Four classrooms that formed part of the older school building were to one side of the double row of rooms and these were only occasionally used as the roofing tiles leaked and the floor was badly cracked. There were no separate rooms for a school library, or for a laboratory. The microscope, chemicals, magnets and other equipment for conducting experiments were kept in a locked cupboard in the Head Mistress's office, behind her desk.

GOVERNMENT HIGH SCHOOL

(Code: GAH)

The high school had strength of 456 students with 230 boys and 226 girls. Out of these there were 134 SC and 31 ST students. One row of classrooms for the high school was at right angles to the Higher Primary school and at the end of this row of class rooms was another row of classrooms that faced the primary school. These same classrooms were also used by the Junior college and separation between the High School and Junior College classes are achieved in time rather than in space. On occasions when there was an overlap in the time, the high school children had to sit on the verandah or in the grounds for their classes. Sometimes they had classes in the unused rooms of

the primary school. Students thus, did not have fixed class rooms as these were always being ‘adjusted’ according to various contingencies. Usually the junior college got over by noon and the high school students had the classrooms with benches available for their afternoon lessons. There was a fourth, newly built wing of classrooms, with inadequate space for even seating children on the floor. These were normally used in the morning hours by the high school students. At one end of the row of classrooms facing the primary school was a computer room which housed 8 computers. This room was usually kept locked and occasionally teachers used this room when two or three of them want to move out of the staffroom for a little private conversation. There was an exit passage next to the computer room. The first room after the exit passage, at right angles to the computer room was the staffroom for the junior college and next to it sat the Headmistress. Next to the Headmistress's room was the staffroom where the high school teachers sat. There was small room in between the classrooms, where laboratory equipment was stored. This room too was invariably kept locked. The high school classrooms were built on a raised platform and thus were visibly higher than the classrooms of the primary school which were built at ground level. Despite children invariably moving on to study in the high school after passing primary school, the two schools function independently and there was very little interaction between the teachers of the two schools.

3.2.2 GOVERNMENT SCHOOL COMPLEX B

(Code: GB)

This complex was located in one of the oldest residential localities of Bangalore North Urban District. The complex had a Government Girls' High School, a co-educational Higher Primary School and a Government First Grade College for Women, within the same expansive compound. This locality had several schools of various types and these included government and private schools under the Karnataka Education Board and also those under other Educational Boards. There were also several Colleges in the same locality.

GOVERNMENT HIGHER PRIMARY SCHOOL

(Code: GBP)

At the time of study, the reported student strength at the primary school was 167, comprising of 66 boys and 101 girls. In a study about public schooling, the authors noted that teachers in the primary school were under pressure to 'double enrol' children who already studied in private or denominational schools. The pressure that the teachers feelt was a result of state policy that required government schools to maintain a certain pupil teacher ratio to avoid being transferred (Balagopalan and Subrahmanian, 2003). It was not clear whether this was the case with this Higher Primary school, however, at least 25 to 30 students were absent on any given day. The posting to this school

must certainly have been a coveted one and some of the teachers had to travel a relatively short distance from their homes in the same locality to reach the school. Despite this, teachers from this school frequently adjusted their classes so that they could leave early to attend to other chores or duties. Two or more classes were often clubbed under the supervision of a single teacher. Despite having three standards together, the class seldom had more than 25-30 children altogether. The records indicated that each class should have had between 25-30 children. This indicated that either the students were frequently absent, or that they were 'double enrolled'. Since this aspect was not directly part of my research, specific inquiries were not made to verify the student strength at this school.

The proportion of SC children reported in this primary school was just under 21 %, which was less than the average for government schools in Bangalore North. The percentage of ST children was about 4%. The school had a sanction for five teaching posts and all the teachers were reporting for work and an additional teacher was on deputation to the school at the time of the study. However, the only male teacher in this school was hardly ever present as he was an active member of the Teacher's Union and was frequently busy with this. This teacher was responsible for teaching science and his absence from the school meant that his classes were 'managed' by the other teachers.

GIRLS' HIGH SCHOOL

(GBG)

The girls' high school had an enrolment of 569 from standards VIII to X. Each class had four sections, out of these one was Kannada medium, and the others were English medium. There were a total of 38 girls-only high schools in Bangalore North and 33 such schools in Bangalore South. Out of the 38 such schools in Bangalore North, 7 were government schools, 21 were aided private schools and 10 were private unaided schools. The girls' high school selected for this study was under the Education Department. Several girls in this school came from either Tamil or Urdu medium backgrounds. The percentage of SC children in the school was 23% and the percentage of ST children was 2%.

The girls' high school had a government girls' junior college in the same premises. In the first year of the study, the staff of the college and the high school shared the same staffroom. The first floor of the building was renovated in March 2007 and the high school staffroom shifted to a room on this floor. The offices of the heads of both the higher primary school and the high school were in one block within the school compound, but the classrooms were built separately. The block housing the offices was part of the old school structure. The entire primary school was housed in a new block built by a local women's charity. The wing where the original classrooms were located was no longer in use, but a few rooms were being used by some families as living quarters. The laboratory for the high school was a tiny room in the old wing

and was usually occupied by the Schedule Caste male teacher who for some reason did not use the staffroom used by the women teachers. The other male science teacher also did not use the common staffroom.

In comparison with the students of the other government high school in Kodigehalli, the girls in this school were much better turned out and usually came to school wearing shoes and socks, unlike the students in the other government school, who wore ordinary footwear or at times none at all. The classrooms too had benches and there was no shortage of rooms. Children were not observed sitting in the verandahs or corridors of the school, as in the other government high school. 22 teachers were teaching in this school and this gave a TPR of 26. In the March 2007 exam, this school reported a pass percentage of 60.87. The pass percentage was 69.83% in math and 71.2% in science.

3.2.3 PRIVATE UNAIDED SCHOOL

(Code: PU)

This was a private unaided English medium school run by the Tunga (Name changed to maintain confidentiality) Social and Education Trust. The trust was established in the year 1994 with the objective of imparting quality education to the children residing in the locality and surrounding areas. Tunga Public School was started to impart education at the primary and high school levels. From the academic year 2004-2005 onwards, the trust had "spread its wings

into higher education" by starting three more institutions – a pre-university college, a B.Ed college and a D.Ed (T.C.H) College. Members of the executive committee of the trust were closely related to each other and belonged to the Lingayat community. The Lingayats are Veerashaivites or militant Shaivites, one of the well-organised Hindu communities. They play a dominant role in the economic, educational, social and political life of Karnataka.

The school was located across the road from a large playing field. The field was part of a Civic amenity zone, under high tension wires. The grounds were maintained by the school, but the land belongs to the City Municipal Corporation (CMC). A board proclaimed this fact prominently in the grounds. The school itself consisted of a three-storey structure built in the form of two wings facing a small central area and overlooking the ground. Recently, another floor had been added to the school, probably to accommodate higher secondary classes. The main gate of the school was usually kept locked during school hours and one could enter the premises through a smaller side gate that led into a waiting area. Several red plastic chairs were lined up against the walls in this area. One part of this faced the central open area. At one end of this reception area was a large desk behind which usually sat a young lady who also had a child studying in the school. She answered phone calls and also taught for some periods. All visitors had to walk past this desk and then past the principal's room if they wished to go further into the school. Students

and teachers also had to walk past the principal's office and past the reception desk, if they wanted to leave during school hours. Access to the central area and the main gate of the school was prevented by means of a few metal barricades that were placed between the verandah of the school building and the central area. Several ornamental plants and a small lawn were maintained in this central area. There was also a bright yellow slide for children in this area which was not used during school hours.

After the principal's office, one walked past a small room labelled "Staff". This room had a large table with about 8 chairs placed around it. The primary school staff occasionally used this room to eat or correct notebooks. It was also used by D.Ed students who came to the school for their internships. Next to this room was a room labelled 'Library'. The doors to this room were always closed. On the wall near the library was a display board. Usually a poem, essay or painting was displayed on this board. Further on, there were junior classrooms. The nursery classrooms are painted brightly with huge cartoon like drawings. Illustrated nursery rhymes are framed and hung high up on the walls of the nursery classrooms. The ground and first floor has classes till VI standard and on the next two floors are classes from VII to X. There was a computer room on the second floor and children regularly used this room for computer classes. Staff also used the computers to prepare question papers, quizzes and the school annual magazine. There was another staffroom on this floor and in addition to tables grouped in the centre with chairs all

around, this room had a long counter running along one wall and also a washing up area. Most of the high school staff used this room to do their notebook corrections, eat lunch, and maintain attendance and marks registers. This room also had lockers in which teachers could keep their personal books/material. There was a blackboard at one end of this room. On the top floor where the classrooms for standards IX and X were located, the school also has a large room with tiled floors and this room was labelled 'Music Room'. This floor also had a laboratory. All the classrooms were well lit with one set of windows opening to the building's exterior and another window opening on to the corridor, which was like a verandah.

At the time of study, the school had a strength of 420 students with 268 students in the primary section (standards I – VII) and 152 students in the higher classes. In the primary school, there were 145 boys and 123 girls and in the higher classes, there were 70 boys and 82 girls. There were a total of 38 SC students in the school as per the records. There were 16 teachers in the school. To place these numbers in context, Bangalore North has a recorded enrolment of 1,25,941 boys and 1,10,349 girls in unaided schools. There are 7,838 teachers working in private unaided schools in Bangalore North. This works out to an average TPR of approximately 30.

Children invariably came to school in uniforms. On Wednesdays and Saturdays, they wore white uniforms and on the other days, it was in a

different uniform as prescribed by the school. During the time of study, this consisted of a brown and white checked shirt worn with brown trousers for boys and brown skirts for girls. All students also had to wear a tie and black shoes with white socks. Children had identity tags and leaders further had a rectangular plastic badge identifying their status as class or house leaders.

In the initial stages of the field study, students and teachers consciously spoke English with the researcher, but as their familiarity increased most interactions took place in Kannada. Among themselves, students would converse in Kannada or at times in Telugu. Informal conversation in the staffroom would often be in Kannada or Telugu. Sometimes, when a teacher who did not speak either of these languages was part of the talk, the conversation would be in Hindi.

This school was one of the first private schools to come up and was managed by a private family trust. Students of this school were from the surrounding areas and belonged to middle class families who could afford the school fees of Rs. 20,000/- (approximately) per annum. Some children did come from working class backgrounds and in their cases, parents had to stretch the family income to allow the children to get a better education.

This school was in close competition with another private school in the vicinity and there was constant pressure to raise achievement in terms of number of high scoring students in the SSLC examinations. There was also

pressure to be seen as a ‘good school’ that encouraged students to participate in several extra – curricular activities such as sports, drama, music, art and dance. The school had also invested in several tennis rackets and each class had one tennis period scheduled per week. Despite all these measures, the head master reported that they were not significantly able to increase their enrolment.

In the first year of study, the school had two sections each for standards VII, IX and X. Standard VIII had only one section. Biology was taught by three teachers in these classes. One of the teachers taught Biology to standard VII and lower standards. She also taught English for these standards. Another teacher taught Biology to standards VIII and IX, while the HM taught biology to standard X. Math and Physics were taught by a male teacher for standards VII and IX whereas another teacher taught Physics and Chemistry to standards VII and VIII, and math to standard X. All the teachers had completed graduation and had B. Ed degree. The male teacher was also enrolled for M. Ed at Bangalore University. Several of the teachers at this school were preparing for the Common Entrance Test held for appointment of teachers for Government schools. In the course of my study, four teachers from this school were appointed to Government posts and the science teacher was one of them. The other science teacher who also appeared for the exam was not selected and she mentioned that she was not really very keen on the

Government appointment since she preferred to work on in Bangalore and in case of appointment would not have been able to take up a rural posting.

3.2.4 PRIVATE INTERNATIONAL SCHOOL

(Code: PI)

The International School was located in one of the suburbs of Bangalore and was managed by a trust. The two founders of the trust first conceived the idea and developed it into reality in 1984. The school was named after prominent Bangalore entrepreneur and Member of Parliament as a result of a generous endowment. After it was built, the school's architect won several awards for designing the modern, minimalist lines of the school buildings. The buildings were "open" - corridors were not enclosed and lead to large, airy courtyards around which were several classrooms. In 1996, a school of Art, Design and Technology was founded by the trust with the objective of "providing art and design education in an environment of creativity and maximising individual potential". This institution was also housed in the same campus as the school. Art works of students from the design school were attractively displayed in the school building.

This school had a broad curriculum for their elementary school that was "designed to acquaint them with both Eastern and Western culture and methods of study". The students studied Indian languages, namely Hindi and Kannada but could also study English, French, or German. Western music,

Indian dance and Indian Classical music were also offered as part of the curriculum. In all, 528 students from 17 nationalities were enrolled in this school in the year 2007. There were 40 teachers working in the school, giving a teacher-pupil ratio of 13.

Examinations were held once at the end of each academic year for grades 6, 7 and 8. For standards IX and X, a choice between the Indian Certificate of Secondary Education (ICSE) and the International General Certificate of Secondary Education (IGCSE) were offered. For grades 11 and 12, a choice between the Indian School Certificate (ISC) and the Advanced International Certificate of Education (AICE) was offered. IGCSE and AICE are conducted by the University of Cambridge International Examinations – CIE. University of Cambridge International Examinations (CIE) is the world's largest provider of international qualifications for 14–19 year olds. They are part of the University of Cambridge and a not-for-profit organisation. Their stated mission is "to work in partnership with education providers worldwide to deliver high-quality and leading-edge assessment services". Their stated aim is to be the preferred international provider of assessment services in the world through harnessing potential, lasting partnerships, high quality, charitable status and innovation. Students were not divided into separate classes for the IGCSE and the ICSE boards until they reached standard IX.

3.3 COMPARISONS ACROSS THE FOUR SCHOOLS

Table 3.1: Comparison across schools

School	Number of girls	Number of boys	Total	% girls	Number of Teachers	Pupil teacher ratio	SC %
District figs. for govt. Schools	43450	41316	84766	51	2500	34	28
GAP	316	287	603	52	12	50	23
GAH	226	230	456	49	7	65	29
GBP	101	66	167	60	5	33	21
GBG	569			100	22	26	23
District figs. for pvt. Schools	110349	125941	236290	46	7838	30	8.5
PU	193	227	420	46	16	26	8
PI	258	270	528	49	40	13	Not available

Note: GAP – Govt. School Complex A Primary School; GAH- Govt. School Complex A High School; GBP- Govt. School Complex B Primary School; GBG- Govt. School Complex B Girl's High School; PU- Private Unaided School; PI- Private International School.

3.3.1 BUILDING AND GROUNDS

The world of the government school appeared very different from that of the private schools. Despite receiving a fresh coat of paint annually, the walls of the government school soon acquired a patina of dirt, but this was not the case with the private schools, which were maintained better. The headmistress of the government primary school lamented about the problem of boys regularly breaking in to the classrooms to retrieve balls which got lobbed inside when the school grounds were used for playing in the evenings or during weekends.

There is evidence from research to show that the overall appearance and maintenance of school buildings has an impact on pupil outcomes. In the case of the government schools, the teachers and heads were expected to raise funds for annual repainting and other repair work through the good offices of local patrons who may or may not be part of the school SDMC (School Development and Monitoring Committee). Rutter et al. cited research that pupil outcomes were better in schools that were kept in good order and in good decorative condition, with broken furniture rapidly repaired and graffiti quickly removed (Rutter, 1983). The review paper also mentioned research by Pablant and Baxter that supported this finding. Broadly, research evidence from other public institutions such as hospitals indicated that people's morale and behaviour generally tended to improve when the environment was well-maintained. Studies also indicated that neglected buildings were particularly prone to vandalism. At GB, windows, electrical switch boards and furniture

had been deliberately damaged by the students. Although this research was not concerned directly with studying the effects of school physical environment on student achievement, the poor condition of the government schools was starkly evident when compared with the private schools.

The government school complexes, GA and GB, both had large open play grounds within the compound, as did the international school. The private school did not have a playground within the school, but students used the public playground across the road from the school for supervised sports and games. There were no watchmen or locked gates preventing entry into either of the two government school complexes, GA or GB. Anyone could enter or leave the school compound without restriction. By contrast, entry and exit to the private unaided school PU and the private international school, PI was controlled. In the private unaided school, one could not enter into the actual classroom area without being permitted to do so. Persons entering or leaving the school building would be visible to the headmaster and also had to walk past the watchman at the gate. In order to gain access to the international school a visitor had to make an entry at the ledger kept with the security guard stationed at the sentry box near the gate, then proceed to the reception window and state the purpose of the visit. The receptionist would then issue a visitor's pass to the visitor permitting entry to the school or alternatively request the visitor to be seated at the visitor's lounge to wait for the concerned person to come to the lounge.

A consequence of restricted access to the classroom areas in the private schools was the prevention of disturbance of lessons. In the government schools the classrooms were accessible to public and lessons could get disturbed by visitors wanting to speak to teachers or students during school hours. Sales persons of notebooks and pens also occasionally walked into classrooms while lessons were in progress. Another consequence of the restricted access was to insulate the teachers and classrooms from direct interaction with parents or caregivers. In the case of government school teachers, parents or relatives of school students felt free to walk into the classroom and speak with the concerned teacher whenever they felt the need to do so. However since the parents/caregivers of the government school students were invariably from working class backgrounds they were not often in a position to take time off from their jobs to visit the school and such instances were not frequent. During the period of this study from August 2006 to February 2008, fifteen such instances were observed – eleven in GA and four in GB. The observed instances at GB involved discussions related to children's academic performance in school or to admission. At GA the instances observed were as follows: parents approached teachers for admission related inquiries on four occasions, on queries related to inclusion on the voter's list on four occasions, twice about requests to take a student home during school hours and twice on issues related to unexplained absence from school. One incident was observed where a salesman approached a

teacher during class to request her to inform students about the pens that he was selling. The teacher passed on the information to the students and continued with the physics lesson after that. No such incidents were ever observed in the private schools. Government school teachers thus had to deal directly with administrative and academic issues concerning students, whereas similar issues in the private schools were dealt with by the principal or other staff members and not by teachers during class hours.

Implicit in the lack of adequate insulation from disturbance in the government schools was the notion that classes/lessons for the students in these schools were not of much consequence and thus could be subject to various disturbances and contingencies. The private schools were more careful about preventing disturbance to the lessons. The role of the teacher in the private schools was primarily to teach lessons and consequently she was not required to deal with other peripheral issues in the course of the day. Contact between teachers and parents/caregivers was regulated by the school's administration. In contrast, the teacher in the government school was called on to directly interface with parent/caregivers and other members of the public.

3.3.2 CLASSROOMS AND LABORATORIES

In the government school (GA), there were 19 classrooms for 1,059 children. Six of these rooms also doubled up as classroom space for the junior college students leading to a chronic shortage of classroom space. Only two

classrooms had benches and these were used by the standard X students. In the other classrooms, children sat on the floor. All classrooms had a small desk for the teacher. Although adequately ventilated, the classrooms were overcrowded with children sitting closely packed on the floor. The primary school (GAP) classrooms had several charts hung high up on the walls consisting mainly of hand drawn diagrams from science textbooks. Above the blackboard, there hung one or two framed pictures of famous national leaders, a calendar and the time table. All classrooms had a picture of the Hindu goddess of learning, Saraswati, centrally positioned above the blackboard. The high school (GAH) classrooms did not have any pictures or charts on the walls barring the framed picture of the Goddess Saraswati. There was no separately designated laboratory in this school complex. If a teacher had to conduct a science experiment for demonstration, then she had to use the small 60cm by 100cm desk in the classroom and have the children queue up to take turns to view the experiment. With class strengths of over 40 children, this process was time-consuming and also resulted in problems of classroom management as children who were not near the teacher's desk got distracted and boisterous. In the case of the high school, where there were more than 70 children in a class, such demonstrations were practically ruled out.

The primary school in the government school complex, GBP, had classrooms equipped with benches and desks and adequate for the number of children in each class. These classrooms also had displays similar to those in

the GAP. The classrooms of the girls' high school, GBG, had adequate seating for students. They also had a desk for the teacher. The walls were however bare with no displays. Some of the older classrooms had a raised teacher's platform and tiered seating, so it was possible for teachers to conduct demonstrations and experiments that could be viewed by the entire class. The school laboratories for both the high schools were not designed for students to conduct experiments or investigations and were mostly being used as stores. The primary schools did not have any rooms separately designated for laboratory work.

The private school had a total of 20 well-maintained classrooms for 420 children with adequate furniture. All classrooms had a raised teachers' platform, equipped with a desk and chair. Most classrooms also had a metal rack, used for storing sundry items like used papers and unclaimed notebooks. There were no displays in the classrooms and the walls were mostly bare. The international school, PI, had very spacious classrooms that were well designed in terms of both function and aesthetics. The large number of boards displaying student work contrasted with the sparseness of the displays visible on the walls of the private unaided school, PU. Both PU and PI had spacious laboratories but the usage of these differed significantly. Students at PI had opportunities to perform experiments and conduct investigations, whereas those at PU were taken to the laboratory to be shown equipment or apparatus.

As discussed above, the infrastructural facilities in terms of classroom space and condition was poor in GA, but adequate in the case of GB and PU and of a high quality in the case of PI.

3.3.3 PUPIL-TEACHER RATIO

A comparison of the infrastructure and pupil teacher ratios in the schools indicated the constraining or enabling factors that were present in the schools studied. In the government school complex A (GA), the primary school had a pupil teacher ratio of 50: 1, whereas the high school had a ratio of 65:1.These ratios were considerably higher than the average pupil teacher ratio for Bangalore North, which was 34:1. In the other government school complex, GB, the primary school had a pupil teacher ratio of 33:1 and the girls' high school had a pupil teacher ratio of 26:1 which was comparable to that of the private school. Both these schools thus had a better than average pupil teacher ratio. The international school had a ratio of 13:1, indicating a high level of staffing.

3.3.4 ENROLMENT OF GIRLS AND SCHEDULE CASTE CHILDREN

In both the government primary schools GAP and GBP, the number of girls on roll was higher than the number of boys. However, in the private aided school, PU, the number of boys enrolled was 145 as opposed to 123 girls. This matched the trend observed in Bangalore North where more girls than boys were enrolled in government primary schools, whereas the reverse is true for

private aided schools. Looking at the percentage of SC children in government schools, the figures varied from 21% to 29%. The overall percentage of SC children in government schools in Bangalore north averaged out to 28.4%. In the case of the private unaided school, PU, the percentage of SC children was 9%. The percentage of SC children studying in private schools in Bangalore North district was 8.5%. Thus in terms of caste-wise composition of students, both the government school and the private aided school seemed to follow the typical pattern for the given school type observed in the district.

In government high schools in the Bangalore North district, the number of girls exceeded the number of boys by about 2 percent of the total. In GAH, however, the number of girls was slightly less than the number of boys. The figures for the private schools show an average shortfall of girls by 6.9% and in the private school chosen for study (PU), the short fall was 8%. The short fall could be explained in terms of parental choice. When family resources were scarce, parents would send the boy to the private unaided school where the fees charged were higher and the girl to the government school. Government schools provided free uniforms, textbooks and mid-day meals. Had these incentives not been there, or had there been no provision of government schools, it seems likely that in very low income families, the girls would not be sent to school at all. Once girls were in school, however, they invariably achieved better than the boys as both the secondary and the senior secondary results indicate.

What seemed to be happening is that when poor parents were unable to afford private schooling for all their children, they made a choice to send one child to private school and this choice was usually gendered with the male sibling being preferred for private schooling (Balagopalan &Subrahmanian, 2003). In a paper about their research project on the dynamics of education inclusion, these researchers discussed how the cultural hegemony of private schooling framed poor parents' interactions with the government school. The growth rate of private aided and unaided schools in urban areas has been phenomenal in the past 15 years (De et al., 2002) and the state has implicitly encouraged this growth by not making significant efforts to raise the functioning and perceived effectiveness of local government schools.

The popular perception about the attractions of private schooling amongst parents was expressed in these words by the principal of the private school PU; "*because children wear uniforms and speak a few words of English*". However, given that overall statistics indicated that on average private schools have better pass rates compared to government (discussed in the following section)schools; parents seem to be making a rational choice by opting for private schooling whenever they could afford to do so.

The overall picture that emerged indicated that in the government primary schools GAP and GBP more girls were enroled than boys, a reflection of parental choice to send boys to private school when family income was

limited. This was the general trend in the whole district. The reverse was true for the private school PU, which had more boys than girls and again reflecting the district wide trend for private schools. PU was at the lower end of the spectrum in terms of the fees charged and attracted students from the impoverished end of the middle class as well as those from better off homes. The international school PI attracted students from very affluent backgrounds and had equal numbers of boys and girls enrolled.

3.3.5 ACADEMIC ACHIEVEMENT

For the year 2006-7, the government high school, GAH, had a pass percentage of 53.94 with 89 out of 165 students passing. There was one distinction, 18 first classes, 24 second classes and 46 pass classes. Math had the lowest number of passes, 62.09% and next came science with 69.7% passes. The girls' high school reported a pass percentage of 60.87. The pass percentage was 69.83% in math and 71.2% in science.

For the same year, the private unaided school recorded an overall pass percentage of 87.8% with 36 out of 41 children passing the SSLC examination. There were 3 distinctions, 23 first classes, 8 second classes and 2 pass classes. Three students had failed in science (the highest number of failures in a given subject), two each in math and Kannada. State-wide averages indicated that private unaided schools achieved a pass percentage of 77.63 and government schools achieved a pass percentage of 67.86 %. This

indicated that the private unaided school in the study was performing better than the average for private schools, whereas both the government schools in the study were performing below the state-wide average for government schools.

If one looked at the pass percentage subject-wise, then math recorded the lowest percentage of passes with 82.93 % and science followed with 86.10%. In all the subjects, girls outperformed boys by 1-2 percentage points. Overall, Bangalore North was ranked 13th among all the districts with a pass percentage of 78.42. (All figures are for the year ending in March 2007, as per Karnataka Secondary Education Examination Board, http://www.kseeb.org/pages/statistics.htm)

Table 3.2: Percentage of students passing

School	Total pass %	Science pass %	Math pass %
GAH	**53.9**	**69.7**	**62.1**
GBG	**60.9**	**71.2**	**69.3**
PU	**87.8**	**92.6**	**95.1**
Average for govt. schools	**69.7**	**86.1**	**82.9**
Average all school types	**80.14**	**87.7**	**83.9**

3.4 DISCUSSION

3.4.1 SOCIAL-STRATIFICATION OF STUDENTS INTO DIFFERENT SCHOOL TYPES

Government schools have mostly become schools for children of the most poor and the low-ranked caste groups, resulting in a ghettoisation of schooling. In general, this was the trend observed in the schools in this study. Students in government schools, GA and GB had parents who earned a living as daily wage labourers, auto-rickshaw or truck drivers, domestic workers, flower sellers, casual labourers, garment factory workers, repair mechanics, etc. In many cases, students also contributed to the family income by doing domestic work before school, or by selling flowers/vegetables/balloons after school. In some instances, children from impoverished rural households had been sent to live with relatives in the city and were enrolled into the government schools. In several instances, children came from single parent households where one parent had died or deserted the family.

A study of selected schools in six states confirms that on an average, about 74% of children studying in government schools are from scheduled caste and backward class families, while private schools have mostly children from the middle and upper caste groups (Vasavi, 2003).

The students at the Tunga Public School (PU), came from families that were able to afford the yearly tuition fee of Rs.15,000 (approximately). About one third of the students at this school came from the nearby upper-middle class locality, whereas two thirds of the students from the school came from lower income settlements. One of the students in standard IX had a weekend job of cleaning cars on weekends and was mentioned specifically as an exception. Other students did not work.

Students at the international school (PI) came from very affluent homes as the tuition fee charged by the school was Rs.100,000 (approximate) per annum.

One of the sociological understandings about education has been about how education acts in the economic sector of a society to reproduce important aspects of inequality (Apple, 2004). Societal ideologies such as merit, competition, and social mobility at once reflect dominant group interests and are prime mediating factors in how dominant groups reproduce, maintain and legitimate themselves. The type and quality of education an individual is likely to receive depends on the individual's relationship to the structure of dominance (Persell, 1977). The tightly-interrelated spheres of wealth, occupation, and caste form the basis of inequality, and constitute the basis of stratification in society. As groups in the hierarchically-arranged stratification

system struggle to maintain or increase their advantage over other groups, such groups coalesce to form a structure of dominance.

Through mechanisms and control of institutions such as the educational system, various other legitimating ideologies are given their fullest expression. In regard to educational structure, schools are differentiated according to type of management and economics, education goals, formal structures, openness to change, teaching staff, and social relations. Moreover, whether the schools are public and under state control, or private and accountable to their clients, contributes significantly to differential educational outcomes. Such outcomes correspond to group affiliation and to one's relationship to the structure of dominance. Societal ideologies (merit and competition) work effectively to influence institutional ideologies, educational assumptions, and ultimately, the views of education itself.

Educational effects have over time come to be primarily restricted to cognitive ends. While the educational effects expressed in the instrumental-meritocratic ideology are not unambiguously related to various life outcomes, such as income and occupation, the effect of the meritocratic ideology is to attribute it to either the individual (IQ, ability) or the group (culture of poverty, lack of parental care) for failing to ascend the socio-economic ladder. It further legitimises the position of those highest in the structure of

dominance in that there is the tacit assumption that those so situated have merited such positions.

3.4.2 SCHOOL-RELATED FACTORS AFFECTING STUDENT OUTCOMES

It is not a simple matter to disentangle the effects of schooling and socio-economic backgrounds upon student achievement in terms of examination performance. It is even more difficult to arrive at straightforward conclusions about the effects of classroom pedagogy and teacher behaviour upon student achievement, motivation and success at pursuing science as a career after school.

As the descriptions of the schools presented earlier in this chapter showed, the different schools varied considerably in terms of infrastructure, pupil teacher ratio and socio-economic background of the students, and as the table 1 shows, they also differed in terms of student achievement, with the co-educational government school, GAH, doing poorly in terms of student achievement. This school also had the poorest infrastructure and the highest pupil teacher ratio.

Indian studies have shown the importance of school related factors, such as infrastructural facilities and materials, actual time for instruction, teacher attributes, in raising student achievement. (Varghese, 1999; Kingdon, 1996)

There is a positive association between school facilities and this effect is stronger in educationally backward states, but weak in educationally advanced states. When the pupil teacher ratio exceeds 50, there is a significant drop in pupil achievement.

The effect of school management type on student achievement varies across different states. Studies in Madhya Pradesh and Uttar Pradesh have shown that private unaided schools perform better than government schools or private aided schools. whereas a study in Tamil Nadu shows that private-aided schools perform better than unaided schools. In Kerala, studies showed that there is no significant difference between private aided and government schools in terms of the level of pupil achievements. (Varghese, 1998).

Research from developed countries conducted in the in the decade or so preceding 1980 had tried to examine whether schooling matters and what effects schooling has on the behaviour and attainments of children who attend them. There seemed to agreement, among several researchers that schools "made little difference" (Coleman, 1966, Jencks, 1979, Bowles, 1977 and Bernstein, 1970) Other researchers did not completely accept the notion that schooling could not compensate for social inequities. It was argued that effective schools could make a difference and that the type of school attended by a pupil has significant consequences (Halsey et al1980)

One of the major developments in the area of school effectiveness research has been the development of quantified measures of classroom environment. Such research indicates that the climate of a school is important. The remainder of the discussion here will, however, focus on the qualities of schools that matter in terms of effects. Rutter (1983) broadly classifies the way in which school effects have been studied by different researchers into three categories: Effects in terms of reducing inequalities; Effects in terms of raising achievement; Effects in terms of variance accounted for.

Studies such as those by Jencks (1972) and Coleman (1966) concluded that equalising educational opportunity would do little to make adults more equal in terms of scholastic attainment, employment opportunities and status, and in income and wealth. These conclusions are based on statistical analysis of variance. Technically, when other things are held constant, a predictor with a wide range will always account for a higher proportion of the variance than a predictor with a narrow range. Thus, if all schools broadly function in a similar manner, the variation in home factors would be far greater than those concerning school. However, the overall conclusion that, changes in education could do little to reduce inequalities, would still remain. Several reasons could be behind this. As far as employment, social status, and incomes are concerned, the inequalities are influenced by many broader political, economic and social factors that have little to do with schools as such.

A more optimistic set of conclusions has been drawn from studies which have looked at school effects in terms of raising standards. The essential feature of this approach is that the school, rather than the individual child, is the unit of analysis. The effect thus refers to the effect on levels rather than on variance. In this context, it is likely that norm-referenced standardised tests are more appropriate for evaluating the effectiveness of elementary schools because such tests are designed to assess skills across the whole range. Public examinations are generally designed to assess pupils' mastery of the contents of particular curricula and can be used for studies of secondary schools. Other outcome variables in addition to scholastic attainment that have been used to study school effects include classroom behaviour, pupil absenteeism, attitudes towards learning, continuation in employment and social functioning. Associations between different measures of outcome in terms of school effects have also been studied. Most studies show moderate levels of agreement among different indicators, but the correlations fall well short of unity. "The implication is that, even though schools that are effective in one respect tend also to be effective in others, the factors that lead to each type of successful outcome may not quite be the same" (Rutter, 1983). It is also important to study whether schools effective for one group of pupils are also effective for other different groups. Rutter et al. (1979) found that on the whole, schools effective for one group of children tended to be similarly effective for others. However, this will not hold good in all cases.

3.4.3. PUPILS' SOCIAL BACKGROUNDS AND ACHIEVEMENT

The better performance in the secondary examinations of PU when compared with the government schools, GA and GB could at least in part be due to differential student intake. The government and private unaided schools differ significantly in terms of the relative percentages of SC or ST children enrolled (see Table 1). Data for the international school (PI) are not directly comparable as the curriculum and examination system at this school was different from those of the other schools. However all the students at PI invariably passed their secondary school examinations and went on for higher studies.

The schools differed considerably in terms of pupil outcome, but what do these differences mean and what could be the reasons for them. As discussed in the earlier section, the schools also differed in terms of their student population, with a higher concentration of students from very low income groups in government schools. The government and private unaided schools differ significantly in terms of the relative percentages of scheduled caste (SC) students enrolled The government schools had a much higher percentage of SC children compared to the private schools (Table 2).

Schools can be usefully compared only after taking into account the characteristics and family backgrounds of the pupils they admit. Some studies have compared pupil outcomes in schools with similar intakes (Finlayson &

Loughran, 1976, Reynolds 1976, 1982). It was found that to a great extent school variations in outcome were accounted by pupil variations in intake. Brookover et al. (1979) compared schools matched on socioeconomic status, racial composition, and type of community served. Another study looked at four inner-city schools with a preponderance of children from low-income ethnic minority families but with levels of reading as good as or better than the national norms. In both the studies, some schools which would have been expected to have low pupil attainment were able to very effective. Several other studies show that significant school effects are noticeable even after intake features had been allowed for statistically.

Many studies have shown that pupil outcomes tend to be somewhat less good, on average, in school with a heavy preponderance of ethnic minority, socially disadvantaged, or intellectually less able children (Rutter, 1983).

By the late 1960s, the main dimensions of the impact of family socio-economic status (SES) on academic achievement were clearly quantified in both U.S. and British societies. Since then, several studies have described how family SES and schooling interactively reproduce social status through children's achievements and educational attainments. Related to this is the search for school effects that identify malleable factors that might mitigate reproductive processes between families and schools. Research in developing

countries has focused on this basic question: “Do schools raise achievement after taking into account the pupil’s family background?”

The secondary examination results observed in the schools chosen for this study were in line with various studies that have been discussed above and that showed that academic outcomes are poorer in schools that serve students from disadvantaged groups. The next two chapters discuss teacher praxis and classroom processes that constitute the poor outcome in science for students from government schools.

3.4.4 Achievement in Science

As can be seen by the high school achievement statistics (Table 2), children in government schools do not do well in science. In an informal interview, one teacher (GAH) remarked that out of the entire batch of approximately 150 students who sit the secondary school exam, perhaps one or two may choose to take up science at the senior secondary level.

There is strong evidence from research to show that students who do well early tend also to do well later, especially in science and mathematics (Walberg, 1991). This is so because the opportunity to learn these subjects is mainly provided within schools and also because they are hierarchically organized. Students who do not learn these subjects adequately at school are likely to fall behind in learning advanced university courses or technical job skills. The opposite is true for students who do well in these subjects at school

and the phenomenon of the academic rich getting richer is referred to as the Mathew effect (Walberg & Tsai, 1983). The students at the government schools were at the poverty end of the achievement scale in science and mathematics and further disadvantaged by receiving less instructional time than their peers in private schools.

3.4.5 CULTURE AND PEDAGOGY

In Bangalore, the state policies are the significant shapers of the rules that govern schools. By allowing multiple agencies to operate schools and even select curricula, the state has created a differential distribution of knowledge resources across schools. The private schools, like PI, that were permitted to follow National or International curricula as opposed to that prescribed by the Department of Public Instruction of Karnataka State, could charge fees that were high enough to prevent entry of all but the most affluent students into the school. Many parents of these students were positioned closer to the sites of discursive knowledge production and thus had considerable influence on the pedagogic discourse in the classroom and indeed were even able to participate in it. The following extract from a classroom at PI served to illustrate this:

During discussion in the VI standard classroom, as the children were seated on the carpeted area following desk work. The teachers had been teaching a lesson on the various food groups and their role in nutrition. In response to teacher-initiated discussion on health practices at home, students responded:
Student 1: My father counts calories.
Teacher: That is so interesting. He wants to stay healthy by watching his weight.
Student 2: My grandfather pricks his arm and tests his blood.

Teacher: I see.
Student 3: My mother writes a healthy food cookbook, I'll get it [to class].
Teacher: Yes, you can bring the book to show the class.
Student 4: My mother is studying nutrition.
Teacher: Let us invite her to school, it will be nice if she talks to the class.

The other class of private schools that were permitted to teach the state curriculum had state prescribed limits to the fees that they may extract from the students.

At PU, parents were not directly involved in the pedagogic discourse and were only required to meet with the teachers on scheduled days when report cards were handed out. The teachers at PU expected parents to provide home support to children's learning either by directly helping with homework or hiring tutors. Teachers explicitly related children's achievement in school examinations to the amount of support they received at home. During conversation with the teachers, it also appeared that they distinguished between two categories of parents. Parents who resided in the wealthier section of the settlement close to the school were perceived as more actively engaged in ensuring achievement of their children by ensuring that the children did their homework regularly, sending them to tuition classes and regularly turning up for meetings with teachers after each examination. Parents staying at Kothihalli (pseudonym for the actual location), categorised as a slum, were perceived as being indifferent to their children's academic achievement and also perceived as those "who never attend meetings" with

teachers. If a student from this area did well in tests, teachers saw it as exceptional and valorised the efforts put in by the student and also the care taken by the parents. Thus, in this school, the differential positioning of different fractions of the middle class vis-a-vis the school curriculum came to light. This is discussed in greater detail in the next chapter.

The government schools were the only schools that admitted students that were unable to pay tuition fees for school education. Parents of these children were mostly engaged in low paid work and not in a position to provide home support for school related learning. The children also supported their families by contributing labour within and at times outside their home. Several of the parents were illiterate and unable to help their children directly in school work and also unable to hire tutors. In both the government schools, teachers spoke about parents having to work and of the economic difficulties faced by the students who themselves often had to work to help their families. Teachers also blamed low academic achievement on parental indifference or inability to provide academic support at home.

In the case of PU, GA and GB (all affiliated to the KSEEB), neither parents nor teachers were active in shaping the content of the lessons taught. In contrast, the teachers and in some instances parents at PI, had a much greater role in shaping the lessons taught. The textbooks prescribed by the DSERT, the academic wing of the Department of Public Instruction, were

perceived by all concerned as defining the content to be taught/transmitted and subsequently, evaluated through tests and examinations.

Studies that have emphasised the cultural embededness of classrooms critiqued the cultureless conception of the particular effects that different schools, located in diverse societies and ethnic communities, are attempting to realise. These observers of schools focus on the normative socialisation that occurs within classrooms: the value children come to place on individualistic versus cooperative work, legitimised forms of adult authority and power, and acquired attitudes toward achievement and modern forms of status (Apple, 2004; Dreeben, 1968; Durkheim, 1956; Mehan, 1992; Willis, 1977). This line of analysis, until quite recently, has ignored links between child socialisation and narrower forms of cognitive achievement. Antecedent inputs or classroom rules, manipulable by central education agencies, have not been of any particular interest, because the socialisation process occurs largely through a "hidden" curriculum.

In the mid-1970s, critical sociological work on schooling was dominated either by the reductive and economistic readings of the relationship between schools and society of Bowles and Gintis (1976) or the studies inclined towards a more or less culturalist reading, such as the work by Apple (2004) or Anyon (1979). The main argument in these studies was about the role of schools in economic and cultural reproduction. Subsequent research

contested this overly mechanistic argument and reproduction was seen as not always successful (Willis, 1977). The focus of studies was not only content, but the form and organisation of knowledge, pedagogy, and evaluation, and the principles that underpinned them (Apple, 1982b). Basil Bernstein's work became crucial in this project. He provided the conceptual basis for analysing both the forms of schooling and also the issue of relative autonomy.

The linking of the micro with the macro is especially possible with Bernstein's analytical conceptualisation and has proved particularly relevant for this research His project is visible in the way he posed the problem; "how the distribution of power and the principles of control are transformed, at the level of the subject, into different, invidiously related, organising principles, in such a way as to position subjects and to create the possibility of change in such positioning" (Bernstein, 1990, p. 13). Bernstein went on to explicate his theory of codes and how they act as social positioning devices. However, he did not believe that class can be completely understood as a set of economic relationships, nor did he believe that a two class model of ruling class/working class was sufficiently explanatory. One of his most powerful insights was the crucial role played by different fractions of the new middle class. For him, this was a key in moving away from any simple equations between the economy and education. Essentially, Bernstein was taking a position divergent from the radical but relatively reductive US tradition that held that by focusing on and

fighting against one easily identifiable dominant class, schooling could be enabled to engage in its supposedly democratising function (Apple, 2002).

As nations and their economies develop, schooling institutions perform an increasingly significant role in the differential distribution of knowledge and information resources. Hunter(1994) writes about how societies such as those of Western Europe and their off-shoots only ever invent a few devices or instruments for the pedagogic socialisation of whole populations in terms of knowledge acquisition. As Bernstein put it, "the most outstanding feature of educational principles and practices is their overwhelming and staggering uniformity independent of the dominant ideology of specific nation states". In his theory of the pedagogic device, Bernstein attempted to explain the rules or principles generating this stability or uniformity across national education systems. Going beyond, he modelled how change may be instigated in the ordering and disordering principles of the pedagogising of knowledge (Singh, 2002).

> "Bernstein (1990, 2000) described the ordering and disordering principles of the pedagogising of knowledge as the pedagogic device. He suggested that this device constituted the relay or ensemble of rules or procedures via which knowledge (intellectual, practical, expressive, official or local knowledge) is converted into pedagogic communication. Such pedagogic communication acts on meaning

> potential; that is, the potential knowledge that is available to be transmitted and acquired. The pedagogic device provides the generative principles of the privileging texts of school knowledge through three inter-related rules: distributive, recontextualising, and evaluative. These rules are hierarchically related, in that the recontextualising rules are derived from the distributive rules, and the evaluative rules are derived from the recontextualising rules. Thus, there is a necessary inter-relationship between these rules, and there are also power relationships between them. First, the function of the distributive rules is to regulate the power relationships between social groups by distributing different forms of knowledge, and thus constituting different orientations to meaning or pedagogic identities" (Singh, 2002: p 573).

In the context of Australian schools, Connell et al. (1982: 133) argued that: "... the ruling class and its schools are articulated mainly through a market, while the working class and its schools are articulated mainly through a bureaucracy". According to Connell, these quite different relationships partly explain an inequitable distribution of educational benefits which grossly favours ruling class pupils. The market relationship through which the ruling class and elite private schools are articulated enables ruling class parents to influence and determine school policies and practices in ways which secure benefits for their children. This market relationship means that the elite private

schools are sensitive to trends in consumer demand. The price of failing to provide the educational goods that ruling class parents seek for their children includes falling enrolments, loss of prestige and economic difficulty. On the other hand, working class parents are not so easily able to exercise power with respect to school policies and practices. Two reasons for this are their comparative lack of economic clout and their comparative lack of cultural capital, in this case detailed knowledge of what schools could and should be doing for their children. What Connell et al. make clear is that any serious attempt to achieve equity in the distribution of educational goods must analyse and respond to the mechanisms and relationships which articulate schools with their clients. For example, a typical response to an inequitable distribution of educational resources is to allocate additional capital resources to the schools perceived to be disadvantaged. However, such additional resources may only result in increased benefits flowing to pupils if they are used in certain ways that are responsive to the special social context of the schools. Moreover, these uses might only be successfully developed through the active participation of parents in their development. But if Connell et al. are right in their account of the articulation of the working class to its schools, then the possibility of such active participation is structurally and culturally hindered and hence the goal of promoting equity is thwarted. Connell et al. have identified two general categories of articulations which categories presumably fit, to varying degrees, different instances.

The social theory which underpins Connell et al.'s empirical investigations includes only a bipartite class distinction, viz. ruling class, working class and seems to fall back into the mould of economic determinism. Bernstein's theories offer a way out of this too mechanistic modelling of school processes. Although not framed in terms of Bernsteinian analysis, work by Hatton (1985) involving the study of a high-achieving Australian public school points to the complex interactions between state provisioning, social class and pedagogic practice.

In the context of the present study, the different provisioning of educational resources in the schools studied is only the first layer in the construction of student achievement or failure. What was presented in this chapter was a broad description of the schools and their locations.

The government school complex, GA was located in a low income area, signifying the population it served in contrast to the private unaided school, PU and the private international school, PI, both of which were located in better localities. The government school complex, GB also served a population of students from low income households, although it was located closer to the higher income homes. In terms of infrastructure, the provisions at GA were inadequate, while those at GB and PU were functionally adequate. At PI, the infrastructure was aesthetically pleasing and the students and teachers had access to a wide range of appropriate educational resources. The

governments schools did not have laboratories that could be used by students/teachers for experiments or investigations. T he laboratory at PU was rarely used, although it was suitably equipped. At PI, regular usage of well designed and equipped laboratories was observed. The pupil teacher ratio was highest at GA and lowest at PI.

In terms of curricula, GA, GB and PU followed the syllabus and textbooks prescribed by the Karnataka state and the students took the SSLC examination conducted by the KSEEB. At PI, the curriculum was designed to help students prepare for exams conducted by the CISE (a national board) or by the CIE (an international board).

The student outcomes in terms of the SSLC secondary school examinations were better at PU than at the government schools, GAH and GBG. Students at PI, who took different examinations, invariably achieved high scores in their secondary school examinations.

The science teachers and their praxis will be discussed in chapters 4 and 5 that are concerned with teachers as agents involved in partly shaping the pedagogic discourse and the discursive processes within the classrooms and. An attempt will be made to delineate the consequences of these various articulations between knowledge, social class and the sites of pedagogic recontextualisation.

4 SCIENCE TEACHERS

The previous chapter (Chapter 3) provided a general description of schools along various dimensions and discussed the possible consequences of these differences on student outcomes. The students who studied in the government schools GA and GB were from low socio-economic backgrounds, students studying at PU came from moderately well to do families and those studying at PE came from affluent homes. In terms of curricula, GA, GB and PU followed the syllabus and textbooks prescribed by the Karnataka state and the students took the SSLC examination conducted by the KSEEB. At PI, the curriculum was designed to help students prepare for exams conducted by the CISE (a national board) or by the CIE (an international board). Thus the official recontextualising fields (ORF) of the schools differed. The ORF of government schools and the private unaided school was constituted by the institutions of Karnataka State's Department of Education. The ORF of the international school was constituted by a national level institution, CISCE, as well as by an international institution namely, the University of Cambridge International Examinations (CIE).The role of parents in the different schools also differed as discussed in the previous chapter – teachers explicitly expected parental support for student learning at home and also drew upon parents' expertise to aid classroom teaching. At PU teachers did not expect parents to support classroom teaching, but were concerned that they should

offer home support to students. Interestingly, teachers in this school classified parents into those who were willing/able to support student learning at home and those who were unwilling/unable to do so. At the government schools parents were not perceived as actively supporting student learning at home.

Since teachers are among the significant but under researched agents of pedagogical discourse and practice, this chapter is an attempt to give a description of who the teachers are, their work contexts and their beliefs and practices. The following description does not claim to see causal mechanisms operating between teacher biographies, beliefs and praxis and it is beyond the scope of the research to attempt to do so. What is offered instead is an illustrative account of the work contexts, stated beliefs and observed practices of teachers, which it is hoped will be insightful, if not illuminating.

Several studies have consistently found that school factors do influence achievement at statistically significant levels (Fuller, 1987). Material school inputs were found to be related to achievement in developing countries, but very few studies from the United States of America or Britain found effects from the level of material inputs. Effects from the school's social organisation and teaching practices appeared to be stronger in these countries. In developing countries, however, simple inputs, especially those directly related to instructional processes, were consistently associated with higher achievement. Qualities of teachers were related to achievement, particularly years of tertiary and teacher training. The teacher's own social class

background and verbal proficiency also affected student achievement as studies from Latin America showed (Heyneman & Loxley, 1983). Although to varying degrees, these researches show how teacher-related variables affect student achievement, they provide us with little understanding of the processes involved. Lortie (1975) and Goodson (1992) writing about changing approaches to research on teachers remind us that – "In understanding something so intensely personal as teaching, it is critical we know about the person the teacher is." (Goodson, 1992: p4)

In his book, *Schoolteacher*, Dan Lortie (1975 p.vii)wrote about the relationship between teachers and educational research studies:

> "Schooling is long on prescription, short on description. That is nowhere more evident than in the case of the two million persons who teach in public schools. It is widely conceded that the core transactions of formal education take place where teachers and students meet … But although books and articles instructing teachers on how they should behave are legion, empirical studies of teaching work – and the outlook of those who staff the schools – remain rare."

Lortie was writing in the context of the US and referring to the relationship between teachers and educational research. Writing later and in the context of the United Kingdom, Goodson (1992), said that teachers were represented in

research studies in aggregated and imprecise statistics or "viewed as individuals only as formal role incumbents mechanistically and unproblematically responding to the powerful expectations of the role set (p. xii)." Towards the beginning of the 1970s, this approach changed and case study research examined schooling as a social process. This approach invariably examined the situation from the pupils' point of view. As Goodson (1992) wrote, "The sympathies of the researchers lay primarily with the pupils, working class and female pupils in particular, who were the 'underdogs' in the classroom, teachers were the villains of the piece (p. 37)." The next shift in approach took place in UK towards the end of the 1970s when attention began to be focused on the constraints under which teachers work and from villains, teachers got to be studied as victims or in some cases "dupes" of the system in which they worked. This research begs the question about the active agency of the teachers. "Researchers, even when they had stopped treating the teacher as a numerical aggregate, historical footnote or unproblematic role incumbent, still treated teachers as interchangeable types unchanged by circumstances or time" (Goodson, 1992: p4). Goodson suggested that more contextually sensitive research, with a focus on life history methods was needed.

The study of teachers' working lives depends, for its viability, upon the teachers themselves. The control of important data rests with the teachers and those involved in the study must ensure that they continue throughout the

process to exercise control over the flow of information. It is evident that in the accounts they give about life in schools, teachers refer to personal biographical factors. From their point of view, it appears that professional practices are embedded in wider life concerns. “We need to listen closely to their views on the relationship between 'school life' and 'whole life' for in that dialectic crucial tales about careers and commitments will be told” (Goodson, 1992, p 16).

In India, public schooling has witnessed several waves of reform since the 1980. Not only in India, but worldwide, “A wave of education reform is sweeping the globe. At all levels, counties, municipalities, departments and states are expecting more and new things from schools. International organisations such as UNESCO, UNICEF, the World Bank and regional banks are calling for renewed efforts to sustain those reforms. Globalisation, the search for new sources of competitiveness, and the goals of democracy, peace, and tolerance have heightened the expectations of the public about schools and education systems” (Reimers and Reimers, 1996: p_469). In the various policies and efforts at educational reform, the voice and agency of teachers is neglected (Reimers & Reimers 1996, Batra, 2005).

As part of educational reforms, the change in the patterns of political and administrative control over teachers has been significant. The National Policy of Education (National Policy on Education, 1986) marked a watershed in the history of education in India. This policy emphasised elimination of

disparities in the educational system and advocated Education for All (EFA), which, since then, has essentially been the focus of five-year plans.

The urgency to universalise elementary education has created new and unforeseen demands on teachers, both attitudinally and also in terms of their academic preparation. Over the years, the profile of the population entering schools has changed substantially in Karnataka. Many of the children entering government schools today are first-generation learners. However, their training has not adequately adapted itself to prepare the teachers to face these changes or adopt pedagogic innovations to meet contextual requirements.

The following section introduces the 24 science teachers who participated in the study. Brief biographies of 11 of these teachers are presented subsequently. The next two sections discuss the various reasons why the teachers chose to teach and their professional development. The last few sections compare the work conditions in the different schools and explore teachers' perceptions about their students in different schools.

4.1 AN INTRODUCTION TO THE SCIENCE TEACHERS

There were a total of 24 teachers involved in teaching science. The following table provides the details about the teachers.

Table 4.1: Teacher details

S. No.	Teacher	School	Gender	Age	Qualification	Experience (teaching)	Subjects
1	Shanta	GAP	F	45	SSLC;TCH	24	Science, Kannada, Hindi
2	Vijaya	GAP	F	52	SSLC; TCH	29	Science, Math, S. St
3	Vimala	GAH	F	34	M.Sc; B.Ed	11	Biology, Chemistry
4	Gayatri	GAH	F	45	B.Sc; B.Ed	18	Physics, Math
5	Sharada	GAH	F	47	B.Sc; M.Ed	22	Physics, Math
6	Nalini	GBP	F	42	SSLC; TCH	20	Science, Kannada
7	Jayanthi	GBP	F	50	SSLC;TCH	28	Science, English
8	Manjunath	GBP	M				Science
9	Sairabano	GBG	F	48	B.Sc; B.Ed	26	Physics, Math
10	Savita	GBG	F	33	B.Sc; B.Ed	8	Physics, Math
11	Girija	GBG	F	37	B.Sc; B.Ed	8	Physics, Math
12	Charumati	GBG	F	47	B.Sc; B.Ed	17	Biology, Chemistry
13	Srinivasa	GBG	M	42	B.Sc; B.Ed	20	Math, Sanskrit
14	Shivanna	GBG	M	45	B.Sc; B.Ed		Biology, English

15	Savitri	PU	F	37	B.Sc; B.Ed	12	Biology, English, Chemistry
16	Shantala	PU	F	31	B.Sc; B.Ed	4	Physics, Chemistry, Math
17	Shivraj	PU	M	28	B.Sc; B.Ed	6	Physics, Math
18	Arati	PU	F	38	B.Sc;B.Ed;B. Lib	14	Biology, English
19	Basavaraj	PU	M	47	B.Sc; M.Ed	11	Biology
20	Sheela	PI	F	28	B.E	2	Science, Physics
21	Maya	PI	F	42	M.Sc; B.Ed; D.Pharm	10	Biology, Chemistry, Maths
22	Kaveri	PI	F	51	M.Sc; B.Ed	23	Biology
23	Mohan	PI	M	29	Ph.D	2	Environment science
24	Meena	PI	F	42	M.Sc; B.Ed	19	Chemistry

4.1.1 TEACHERS IN THE GOVERNMENT PRIMARY SCHOOLS: GAP, GBP

Shanta, Vijaya, Nalini, Jayanthi, Manjunath

Of the five teachers who taught science in the two government primary schools, four were women above the age of 40. Manjunath, the only male primary school teacher in this study, posted at GBP, was 36 years old. All five of these teachers had SSLC, TCH as their qualifications. All five of these teachers had studied in rural areas and after completing Secondary School (SSLC) had studied and passed the two-year Teachers Certificate Higher (TCH) examination and had been initially posted in rural areas after being recruited into the government schooling system. All the five teachers

mentioned that they had to struggle with the bureaucracy to obtain a posting in the city.

Two teachers taught science at GAP, Shanta and Vijaya. Both were senior teachers with 24 and 29 years of experience respectively. Shanta was 45 years old and Vijaya was 52. Shanta taught Science and Hindi to VII Standard students and Kannada to VI Standard students. Vijaya taught Science to VI Standard, Kannada to Standard VII and mathematics to Standard V students. Both Shanta and Vijaya had strict demeanours and did not tolerate any mischief in their classrooms. Both of them carried a stick to their classrooms. The stick was not used very often and when wielded, the stick was used to deliver a single stroke to the leg of the erring student.

At the other government primary school, GBP, this researcher was informed that Manjunath was supposed to teach science to standards VI and VII. However, since he was an active member of the Karnataka State Primary School Teacher Association, Manjunath spent very little time in the school and it was not possible to observe his teaching during the period of this study (August 2006 – December 2007). Nalini, aged 42, had sought and obtained a posting to GBP from another primary school in the same ward of the city as a pre-emptive measure against being posted to some rural area since she had already been working in the same primary school for over 10 years. Nalini, confessed, that she was not very confident about teaching science, but managed Manjunath's classes with the help of a series of lessons on CDs

developed for standards V to VII, which had been given to the school. On two occasions when this researcher was at the school, children were made to watch these CDs, without supervision, while Nalini was busy managing standards I to III. Like the two teachers at GAP, Nalini also used the stick once in a while to control unruly students. Jayanthi, aged 50 years, had been posted as headmistress to GBP in June 2006, three months prior to the start of the field work for this research. Jayanthi seemed to enjoy teaching science to standards V and VI, whenever the somewhat fluid teaching arrangements at this school gave her an opportunity to do so. She also taught English to these standards. Unlike the two senior teachers at GAP, Jayanthi did not have a very stern demeanour and did not take a stick with her when she entered the classroom.

4.1.2 TEACHERS IN GOVERNMENT HIGH SCHOOLS: GAH AND GBG

Charumati, Gayatri, Girija, Sairabano, Savita, Sharada, Shivanna, Srinivasa, Vimala

The nine high school teachers who worked in the two government high schools, ranged in age from 33 to 48. The youngest was Savita and the oldest was Sairabano, both of whom were teaching at GBG. All nine teachers had completed their initial education in government or government-aided schools. The science teachers had completed their graduation in science (B.Sc.) and B.Ed. Vimala (GAH) had completed her M.Sc in microbiology before doing her B.Ed and getting appointed as a high school teacher in 1997. She was the only postgraduate out of the nine government high school teachers. At the

time of this research, in 2007 Vimala was studying for her second master's degree in chemistry and successfully completed the degree in 2009. Sharada, who taught physics and mathematics at GAH had completed her M.Ed also before being appointed as a teacher in a government high school in rural Mysore in 1984.

At GAH, all the three science teachers were women, whereas at GBG, two of the six science teachers were men. One of the men science teachers at GBG, Srinivasa, aged 42, was waiting for a promotion posting and did not seem to teach lessons at the school. Sairabano, 48 years old, and Charumati, 47 years old, had both initially worked in private high schools before being appointed in government high schools. Two of the teachers, Gayatri (GAH) and Shivanna (GBG) had initially worked as part-time teachers at government high schools for very low wages. Shivanna had then worked at non-teaching positions before receiving appointment as assistant master at GBG in 1997. Gayatri had received her appointment at GAH in 1998 after working for ten years as a part-time teacher in another government high school. Two of the younger teachers at GBG, Savita, aged 33, and Girija, aged 37, had both received their appointments in 1998. Savita and Girija bore a striking resemblance to each other and were often mistaken to be sisters. Coincidentally, they also belonged to the same district, Hassan.

None of the high school teachers went into classrooms armed with a stick, unlike the teachers in the primary school. However, on two occasions,

Vimala had hit boys after being told by other students that they had left the school premises without permission during lunch hour. Sharada and Gayatri had also slapped students in the presence of the researcher on one occasion each. No incidence of a teacher hitting a student was observed at the government girls' high school GBG.

4.1.3 TEACHERS IN TUNGA PUBLIC SCHOOL (PU)

Arati, Basavaraj, Savitri, Shantala, Shivraj

Four of the five teachers who taught science at the private unaided school, affiliated to the Karnataka Secondary Education Examination Board, had themselves studied under the same system and obtained their SSLC from Karnataka. They had also all completed their graduation from government colleges. Basavaraj, Shivraj and Savitri had studied in government high schools in Kolar district. Shantala had completed her SSLC from a private-aided school in Bangalore. Arati, however, hailed from Maharashtra and had studied in Amravati till her graduation.

The youngest of these five teachers was Shivraj, who at 28, had moved to Tunga Public School in 2005 after working at two other private schools. He left the school in 2007, having cleared the selection examination for government high school teachers and receiving an appointment to teach in Gulbarga district. Basavaraj, at 47, was the oldest of the five teachers and was the Principal of Tunga Public School. He taught biology to standard X. In

April 2007, he was asked by the management of the school to take charge of the D.Ed (Diploma in Education) college run by the same trust. By December 2007, he was back as principal of Tunga Public School.

Shantala, 31, Savitri, 37 and Arati, 38, had all worked at other private schools before joining Tunga Public School. Arati had initially started working as a teacher in Amravati, but after marriage had moved to various places with her husband and had worked in two schools in Hyderabad, before the family moved to Bangalore and she found a position as biology and English teacher at Tunga Public School in 2003. In March 2007, she resigned from her job, because she felt that she needed to spend more time at home looking after the family and also to help her son with his studies.

Shantala was unexpectedly widowed at a young age and lived with her husband's joint family. She too had appeared for the government teachers' selection examination with Shivraj, but had not managed to clear it. She mentioned that she was not taking the examination too seriously since receiving an appointment in a government high school would involve moving out of Bangalore and she preferred to continue with her present living arrangements. Working at Tunga suited her since she did not have to travel far from home. Shivraj, Basavaraj, Arati and Savitri also resided within three kilometres of the school and did not have to commute long distances to the school. Basavaraj and Shivraj had both worked at jobs other than teaching.

Basavaraj had joined Tunga in 2001 and became the principal of the school in 2002.

Teachers in Tunga Public School were expected to maintain strict discipline in the class, but were not allowed to use corporal punishment of any sort. Unlike their counterparts in government high schools, these teachers did not hit students on any occasion. If there was a major concern about student misconduct, the principal of the school, Basavaraj was called in to deal with it. Basavaraj dealt with misconduct by talking to the students and if that did not work, he called in the parents of the misbehaving students and asked them to warn their child against misbehaving in school.

4.1.4 TEACHERS AT THE TARA INTERNATIONAL SCHOOL (PI)

Kaveri, Maya, Meena, Mohan, Sheela

Of the five high school teachers in Tara International School, who were respondents in this research, four (Kaveri, Maya, Meena and Mohan) had postgraduate degrees in science. By contrast, among the teachers in the other schools, only Vimala had a postgraduate degree in science. Sheela, who taught physics to standards VII and VIII had a degree in engineering, while the other teachers had degrees in science. All the five teachers at Tara International had studied in private schools affiliated to one of the two national level boards of secondary education – either the Central Board of Secondary Education (CBSE) or the Indian Council for Secondary Education(ICSE).

Kaveri, 51, was the senior-most of the five teachers in terms of age and experience having worked for 23 years as a high school biology teacher. She had worked at a well-known private school in Mumbai for 18 years before shifting to Bangalore along with her husband who had moved to Bangalore on receiving a lucrative job offer. Kaveri was a strict 'no-nonsense' type of teacher who used a lot of sarcasm in the classroom. Maya and Meena were both 42 years old and had also moved to Bangalore with their husbands. Meena had worked in several private schools, prior to joining Tara International in 2003. She had to find a different school to work in each time her husband was posted to a different location. In Bangalore, she had taken two breaks from her teaching career on account of her family responsibilities. After each break, she took up teaching in a different school. Maya had discontinued her research studies after the birth of her daughter and had taken up teaching when her daughter was ready to go to school. Maya had taught in Singapore before moving with her family to Bangalore. Kaveri and Maya had B.Ed degrees from Mumbai, whereas Meena had done it by correspondence.

Sheela, 28, and Mohan 29, had both moved into teaching from other professions. Sheela, an engineer, had opted out of her profession, and was happy with her present work as a teacher. Mohan had a doctoral degree in biology and had taken up teaching as his earlier work as a field researcher involved long periods away from home, negatively affecting his health and family life. Both these young teachers expressed that they enjoyed working

with young students. They said that the school did not consider it important that they should have completed B.Ed. in order to teach. Sheela explained that at Tara International, there was a system of induction and orientation for new teachers that helped new teachers acquire the necessary skills and capabilities to teach well.

4.2 BIOGRAPHICAL SKETCHES OF THE TEACHERS

Brief biographical sketches of 11 teachers are presented below. These include Shanta, Vijaya,Manjunath and Jayanthi from the government primary schools, Gayatri,Vimala,Sharada,Sairabano and Shivanna from the government high schools, Shantala and Shivraj from the private schools. These were teachers with whom this researcher was able to establish a personal rapport and the details of their lives were shared with the researcher during informal conversations and not from structured interviews.

4.2.1 TEACHERS OF GOVERNMENT PRIMARY SCHOOLS

At the Primary level, teachers were expected to teach all the school subjects. Teachers who taught at this level were required to complete two years of teachers' training to obtain a Teacher's Certificate Higher, after completing their secondary school examinations (SSLC), as per the old rules of the Karnataka State Education Department. However, in practice, at GAP, the teachers had mutually decided upon the subjects that they would like to teach for standards VI and VII and accordingly, the two teachers who formed part of

this research were Shanta and Vijaya. Shanta taught science to standard VII and Vijaya taught environmental science to standard VI.

It was difficult to speak with or interview the science teachers in GBP, since they were not present at the school when several of the visits were made. When present, they were not always free to speak, since they were engaged in record keeping chores, organising the mid-day meal or taking a combined lesson for two or three standards at a time as many of the other teachers had absented themselves. The arrangement of classes and lessons also appeared to be quite fluid, with one of the teachers standing in for the others; combining two or even three standards together; and at least on one occasion teaching two different subjects to two different standards at the same time.

Shanta: Shanta was 45 years old and had been teaching for 26 years, ever since her appointment as a primary school teacher in 1982. Shanta commuted to work from Yelahanka, about 7 km from GAH. Shanta wore thick glasses and had a somewhat stern appearance as she rarely smiled and tended to speak in a rather loud tone. She was proud of the fact that some years ago, her science class had achieved a very high pass percentage in the state level VII standard examinations and the school inspector had specially sought her out to praise her. She declared that all her students passed in science each year.

Shanta had completed her SSLC from Kalidasa High School in Tumkur in 1977. She had studied till the seventh standard in a government

school. Her father was a primary school teacher, but her mother had not been to school. According to Shanta, her school was similar to the one in which she taught now. She mentioned that the methods used were similar to the ones she used now. For her secondary education, Shanta joined a private school and recalled the name of a teacher there, Subbulakshmi.

Researcher: *How did she teach? Like you do now or[1]...?*
Shanta: *More or less like this. The private school was good. They really taught us hard* (*sakkatagi paatha madsidaru*). *Monthly tests, and prizes for those who did well, that was an incentive to study hard. Even though I had no tuition, nothing, I managed 60 percent in SSLC.*
Researcher: *Did your parents help?*
Shanta: (laughs) *Mother is uneducated, father was a school teacher like me. He was so busy making a living for all of us – we were nine like* navagrahas *– where was the time to teach us at home. But still we had a room upstairs where we all used to study.*
Researcher: *It must almost seem like a little classroom at home with nine of you*
Shanta: *Yes, and four or five friends would be there as well. All of us studied. Father was involved with drama and got home late – 10, 11, 12 o clock. If we were still studying he'd tell us not to study and go to sleep and wake us again at four o clock. I remember once I had to write* kagunita *365 times, master was angry, he told us to write 365 times. I did it. Some did, others didn't, but I did it. Those days we did as we were told, studied hard, not like these children these days – even if we tell them, they don't do their work and come.*

Shanta completed her teacher's training in 1979 from the Government Teacher's Training Institute in Tumkur. In 1982, she was appointed as a teacher at Government Higher Primary School at Sira, Tumkur. In 1992, she moved to GAH and has been there since. Shanta was teaching Science and

[1] Conversation in Kannada that has been rendered in English is in italics In some places where the Kannada word/phrase has been retained, the meaning is shown within square brackets.

Hindi to standard VII and Kannada to standard VI. Shanta was married in 1985 and had one son who had recently got admitted to an engineering college.

Vijaya: Vijaya was the other teacher at GAH who taught science-related topics under the subject Environment Science to standard VI. The interactions with her were limited as the classrooms observed by me were from the VII standard onwards.

Vijaya was 52 and taught Kannada to standard VII, Environment Science to standard VI and mathematics to standard V. She had completed her SSLC in the year 1972 from Sri Vidya Ganapathi High School in Jangamakote, Sidlagatta. In 1974, she did her teacher's training from the Teacher's Training Institute run by the same trust as her school. This institute has since been shut down. She got married the same year as she completed her Teacher's Training and was not employed till 1977. Vijaya's first appointment was at the Government Primary School, Sabbenahalli, Chikkaballapur, where she worked from 1977 to 1981. Her next posting was at the Government Model Primary School at Chikkaballapur, from 1981 to 1983. From 1983 onwards, she has been working at GAH, a period of 23 years.

Manjunath: Science for the standards VI and VII were supposed to be taught by Manjunath who, in 2004, was elected to the post of General Secretary, Karnataka State Primary School Teachers Association, North Range. Over the

course of 20 visits spread over a year, Manjunath was available at school on only one occasion, when he was briefly interviewed.

Manjunath was 36 years old and had studied and completed his schooling in the charitable school run by the Siddaganga Math, in Tumkur district. He obtained his SSLC certificate in 1986. After this, he enrolled for the teacher's certification course, TCH, at the Teacher's Training Institute, run by the Rashtriya Vidyalaya group of institutions in Jayanagar, Bangalore. He was a merit student and completed his teachers' training course in 1988.

In the same year, Manjunath was appointed as a teacher at the Bapuji Primary School at Magadi Road. This was a private aided school. Manjunath belonged to the dominant Lingayat community and although he himself came from a poor family, both the school where he studied and the school that he first joined as a teacher, were institutions run by this community. He worked at this school for a year and the following year, he joined another private aided school as the salary was somewhat higher there. He was also active in the Karnataka State Primary School Teachers Association and was elected as the Jilla Pratinidhi (District Representative) in 1988.

In 1991 November, Manjunath managed to get a government appointment at the Government Lower Primary School in Hiralpodu village in Kanakapura Taluk of Bangalore Rural District. He worked there for ten years and remained an active member of the Karnataka State Primary School Teachers Association.

In September 1992, Manjunath was transferred on request, to the Government Higher Primary School, Doddabyalakere, located in Bangalore North District. In 2001, he moved to Government Model Primary School in Mathikere and eight months later he became the cluster resource person for the Malleswaram cluster of primary schools. His next appointment was at the Government Model Primary School at Cox Town, and finally he managed to get his desired posting at GBP, in 2003. In 2004, he was elected as the General Secretary to the Karnataka Primary School Teachers Association, North Range.

In addition to his activities in the teachers association, Manjunath also had the following roles to play at the district level: Sports organiser, Coordinator for Pratibha Karanji (Talent identification program for schools), Teacher's Day celebrations, Children's Day celebrations, and Rajyotsava celebrations. When asked about his teaching duties, he explained that since he had a good understanding with the Block Education Officer, he could get an extra teacher deputed to the school where he was supposed to be teaching. Thus in his view, his activities as a functionary of the teachers association did not adversely impact his students. He saw his role as looking after the welfare of teachers and working to ensure that they got their increments, could take out insurance policies and get loans sanctioned. Manjunath felt obliged to justify his non-teaching activities by mentioning the ways in which he contributed to the Government Higher Primary School, GBP : *"After I came,*

the new buildings were made. I got 4 rooms sanctioned and 4 more rooms were built through the Ladies Circle."

Jayanthi: Jayanthi had been appointed HM of GBP the same year as the study visits to the school began. She was 50 years old at that time. She was administratively quite busy in the initial months as she had to take charge of the school and maintain continuity in records as well as deal with staffing issues. One of the teachers of the school, Manjunath, was an official of the Karnataka Primary School Teachers Association and did not find time to teach at the school and his periods had to be allotted to other staff members, who more often than not resisted these additional teaching responsibilities. One of the other teachers had been deputed form a Government Lower Primary School at the behest of Manjunath, who had an understanding with the BEO. This deputed teacher tended to avoid engaging classes on various pretexts.

Being HM did not seem to confer significantly greater powers of authority on Jayanthi, and the position was perceived by all concerned as a concession given by the state for the years of service. The HM did have the responsibility to maintain and submit various school records as required by the system and was also responsible for the material resources in the school. The interaction between the teachers and the HM was one of mutuality and even friendship, but at the Primary School level, the HM did not/could not insist upon teachers working in any way, except what was mutually acceptable.

Jayanthi had started service as a government school teacher in the year 1978, after completing her teacher training at Gramantara Vidya Samste TTI, Devanahalli and obtaining the Teacher's Certificate Higher. She had completed her SSLC from the Government High School at Bagepally. Her first posting was at Government Lower Primary Girls School at Boodigere.

Jayanthi was the younger of two sisters, and unlike her elder sister had refused to get married immediately after school and had to persuade her family to allow her to work. Teaching was considered the only suitable job for women and thus she was allowed to enrol for her teacher training course.

Since she was posted initially to a girls school, she took up the position though she had to commute from home and walk about 2 km from the main road to reach the school. She was at the school for five years before being posted to Government Higher Primary School at Shivakote, Bangalore North. She got married to a government employee who worked with the Karnataka Silk Development board and moved in with her in-laws at Chikkabanavara near Yeshwantpur. The time taken for commuting increased as a result of this, but she was reluctant to give up her government job and her in-laws were supportive of her work. Her mother-in-law was cooperative and gave her coffee and tiffin before she left the house each morning at 6 a.m. However, in the evening it was her responsibility to cook the family meal, although other women in the house like her unmarried sister-in-law helped with the chores. The joint family also helped when the couple had a son.

Jayanthi continued at her posting at Shivakote for the next 22 years before being posted to her present school at GBP, in the city. Jayanthi's son had, meanwhile, completed his engineering degree and had taken up employment with a private construction company in Bangalore.

4.2.2 TEACHERS IN GOVERNMENT HIGH SCHOOLS

Gayatri: Gayatri, 45 years old, taught physics and mathematics for classes VIII to X at the Government High School, GAH, and was class teacher for class XA. During the initial visits, she had been on medical leave as she had undergone a hysterectomy. This was disclosed during an initial conversation with her enquiring about her absence from school during the initial weeks of the new academic year. Every day Gayatri travelled from her home at the southwestern part of Bangalore to GAH which was in Bangalore North. She thus was commuting a distance of nearly 40 km each day by bus. On several occasions as I was walking to the school, I saw Gayatri rush past in one of the unmetered auto-rickshaws that plied from the bus stop on the highway to the stop near GAH.

Gayatri was married and said her husband was doing business. Her daughter was studying in the seventh standard at Holy Angels High School, near her residence. Gayatri’s in-laws stayed at the ground floor of their two storey house and this meant that Gayatri’s daughter had someone at home to look after her when she got home from school. Gayatri invariably packed lunches for both herself and her daughter before leaving home at around 7a.m

each morning. She also was responsible for the family meal in the evening once she got back from work. In addition to this, she had to help her daughter with her studies. During a conversation in the staffroom, she grumbled that the child had to be dragged away from her grandparents' television set, always a contentious issue.

During another interaction with Gayatri in the staffroom, she mentioned that her daughter's school reports were being given on that day: *"My daughter's marks card is being given today. If they insisted like that…* (referring to the conversation thread about parents attending meetings at school during which student report cards would be shown to them) *If they want me to come, they write in her diary – bring your mummy to school. If my husband goes he just nods for everything (laughing). My daughter says – mummy ask daddy what they said. He just nodded for everything! If I have to go, then I have to apply for leave here."*

Like Gayatri, most of the women high school teachers brought home-cooked lunches in tiffin boxes to school. The male teachers, like the Physical Training Master and the Tailoring Master sometimes brought lunch cooked by their wives to work, or at other times went out to eat at a nearby stall or restaurant. Women teachers did not leave the school during working hours. On the few occasions that I did not take my own lunch box, Gayatri would insist on sharing her lunch with me. Conversation at lunch time often centred on

food and recipes, and the parenting issues of teachers' children and their studies.

Gayatri's natal family lived in a village near Magadi and she mentioned that as a student she had to walk eight kilometres to school. At around the time she had to join the seventh standard, the family moved to Magadi as a consequence of some issues related to the land reforms in the state. Gayatri had completed her secondary school (SSLC) and pre-university college (PUC) from Government Junior College, Magadi. She said that she had studied throughout in English medium institutions and had found the transition to teaching in Kannada quite an effort. For her PUC, Gayatri had chosen to study physics, chemistry, mathematics and biology. After completing PUC, she had to "sit at home" for two years till her younger sister also completed her PUC and then the family felt that it would be alright for both the girls to go together to college, which they did. Gayatri completed her B.Sc from Vijaya College, Jayanagar, with physics, chemistry and mathematics as her subject. After completing her B.Sc, Gayatri obtained her Bachelor of Education from Vijaya Teacher's College in 1988. For the next ten years, she worked as a part time teacher at Government High School, Bachenahatti, Magadi, starting with a salary of Rs.400 per month. This school was established the year Gayatri completed her B.Ed.

One day in the staffroom, Gayatri and other teachers were filling in their employment record.

Gayatri (as she was filling in the form): *I joined here in August 1998, so how long have I been here? …* (counts on her fingers) *Seven years and eight months … yes seven years and eight months, isn't it?*
Researcher: *Where were you before coming here?*
Gayatri: *Magadi – I was a part-time teacher for ten years at Rs.400 per month*
Researcher: (raised eyebrows)
Gayatri: (grins) *What to do? 1994 government passed an order then we got 1500 basic, HRA, DA … then I applied and got here*
Researcher: *Arrears?*
Gayatri: *I am happy at least I got this much. Others who could chase papers have got the amount.*

In the middle of her teaching stint at the Bachenahatti High School, she got married, in the year 1993, at the age of 32. There was no opposition from her husband's family about her continuing to work, since she was in any case only employed part-time.

Gayatri mentioned that she found the initial years of teaching difficult as she had to learn all the Kannada terms in mathematics and science that she had learnt in English. "I struggled hard" was what she said, about her first year or two of teaching in Kannada. She mentioned that she had to find equivalent Kannada terms for words like "coplanar" and "parallel lines". When asked whether Gayatri did not resent working at such a meagre salary, without being confirmed as a teacher, she merely shrugged her shoulders and said that she was happy that she finally managed to get posted to GAH after so many years of working as a part-time teacher. She said that there was *"no CET in those days".* CET is the common entrance test conducted by the state for the selection of teachers.

In school, Gayatri was fairly popular among the students and unlike some of her colleagues, she did not resort to the stick as a means of controlling students. She generally spoke pleasantly in class and on several occasions asked me if I could help her plan some experiment that she could show the students, although this did not actually take place. She maintained that she herself was unfamiliar with the equipment, never having had the opportunity to use them herself during her student days. On one occasion, she agreed to my suggestion that we take along some lenses and mirrors to a class that was being taught the chapters on light, and also agreed that I could show the class a simple trick of making a coin visible over the rim of a shallow dish, by pouring water into the dish. In her mathematics classrooms, Gayatri clearly gave more attention to girls, although she denied it when the researcher discussed this observation with her. It was quite likely that she was not herself aware of this bias in her attention. One student whom the researcher came to know outside school, reported that she had managed to pass her mathematics in her SSLC examination as she had been taught by 'Gayatri miss'. Some other students with whom the researcher had brief conversations also seemed to agree, that there was a better chance of passing mathematics if the X standard section was taught by Gayatri rather than the other teacher Sharada. Since there were two sections, mathematics was taught by Gayatri and Sharada, who each handled one section. Each section had over 80 students with boys narrowly outnumbering girls. What follows is brief description of a

mathematics class taught by Gayatri which shows clearly her greater attention to girl students.

GAH.L.26 (Kannada medium):
Gayatri was taking mathematics for VIII A section and the black board indicated that 56 out of 70 students on roll were present in the class. The lesson was about expansion of a polynomial expression of the form $(a + b + c)^2$. After repeatedly giving the students practice in writing out the expansion, Gayatri began to work out the problems. She wrote
$(a + 2b + 3c)^2$
on the board and then called on two girls specifically by name and asked them to say out loud the various terms of the expansion. After a student said out one term, another student was asked to say out the next term and so on. The girls were asked first and then the boys. This was a significant departure, since in the classrooms of other teachers that were observed, if students were called on individually to answer, it was the boys who got called on first. As the lesson proceeded and students started working out problems in their notebooks, some girls were the first to finish. They triumphantly stood up to show their notebooks for Gayatri to check and one of the girls, turned to the boys and said: *"We did it first!"* Gayatri responded by saying, *"Give them (boys) another five minutes and they will do."* As the lesson proceeded, about 6 or 7 girls were standing to get their notebooks corrected, and so were 3 boys. Gayatri first spent time looking into the notebooks of the girls and by the time she had finished with them, two of the boys sat down without waiting to get their notebooks checked, and by the time the lesson ended, Gayatri had managed to look into only one boy's notebook whereas she had checked the notebooks of at least 8 girls and in some cases more than once.

After observing a similar focus on girls in several of the mathematics lessons taught by Gayatri, she was asked about it:
Researcher*: You seem to give more attention to girls?*
Gayatri: *Some attention here, some attention there!*
As the conversation continued, Gayatri proceeded to explain that compared to the girls the boys were dull. On being queried whether she felt that this was a general trend, or specific to the VIII A mathematics class that she was teaching, she clarified that she was talking in reference to this particular class. She continued to explain how even though she spent 20 minutes giving attention to boys and ten minutes to girls, the girls were doing better. The difference in attention given by Gayatri to boys as compared to girls, noted in the classroom transcripts was not so perceived by her. She mentioned that except for two boys, none of the others did well in mathematics.

Gayatri: *If I scold, shout, beat the girls, they will do homework and do well. But boys… If I threaten the girls by scolding and shouting, the next day they will do their work and come, the boys – they will give chakkar* – [absent themselves!]

One girl in particular, seemed to be a favourite of Gayatri in the VIII A class. In one instance, while remarking that all her mathematics problems had been solved correctly, Gayatri asked whether the girl only studied mathematics and not other subjects. When the girl nodded indicating that she studied other subjects too, Gayatri wondered aloud why the other teachers had so many complaints about her.

Vimala: Vimala, 34, taught biology and chemistry at the Government High School, GAH. She was married and lived in a rented first floor house within walking distance of the school. She did not have children and was undergoing treatment for infertility. Her husband was engaged in trade and was a hobby gardener as could be seen by the number of potted plants on the terrace of their home. They had moved there after Vimala got her appointment at GAH. Vimala had known her husband when she was a student. Some friends had introduced her to him and he was of the same caste – 'lingayat'. After Vimala got her appointment as a high school teacher they decided to get married. However her father opposed the idea. Vimala's father was a shopkeeper at a village near Doddaballapur. He had studied till III standard and her mother had not studied at all. *''My parents said, when you have studied so much, have*

a government job why do you want to marry a person who just runs some business?"

Vimala felt that had she married an IAS or a government officer, she may not have found the love she did with the man she is married to now. She declared that she received more affection from him than she did even from her mother. She talked about her brother who worked in a private bank and was being very selective when it came to choosing a bride for himself. She, on the other hand, was more accepting and but for the fact that she is childless, she has no regrets about her marriage. She reminisced about the initial days of her marriage when weekends were spent cooking for a large number of her husband's friends. She wondered if many wives would have been so accepting of their husband's friends sharing the family meal. During this period, Vimala was commuting on weekdays to Kolar.

Vimala had completed her SSLC from the government high school at Hanabe, Doddaballapur. After that she moved to the city to do her PUC in physics, chemistry, mathematics and biology from SJRC College in Bangalore. She had to stay with relatives in order to do this and said that this had not been a pleasant experience. She mentioned that she had to 'struggle hard' and make a great deal of effort to learn English and cope with the changes involved in moving from a rural area to the city.

(Referring to her school in the village) *My teachers were not so good – the biology teacher – in one year, he took one class! In the VIII standard – the whole year he taught what is bacteria, that's all.*

She felt her lecturers in college were good and she named several of them. She especially mentioned the Zoology lecturer, whom she referred to as her godfather. He had retired as principal of the college and taught Zoology in such a way that Vimala could remember a lot of it. She mentioned her difficulties coping with English in the beginning of her college studies. *"I studied in Kannada medium till PUC – PUC in English medium. It was very difficult. I took tuition in second PUC for maths. Ourselves, we have grown up in full rural place. In maths, surds and all – I didn't know what about surds – I cried so much after coming home from class that time."*

Staying away from home in the city also was not a pleasant experience for Vimala. "*I shifted to my mama's house. His wife didn't like me – I can't say to my mother – her own brother! What no – I should not open book- only housework – after housework, my mama will say – why are you studying in front of me. No lights after ten o clock!"*

Though she did get a seat for professional studies, having appeared in the common entrance seat, CET, she could not go for it. "*I got CET seat – I didn't go – Rs.4000 was too much for us! I joined B.Sc, got first class in all three years."*

After PUC, she completed her B.Sc degree in chemistry, zoology and mathematics from SJRC Degree College in the year 1993. By 1995, she had completed her B.Ed and went on to complete her M.Sc in microbiology from Maharani's college, in 1997. It had not been her original intention to become a teacher, but she was forced by her father to join teacher's training college after her B.Sc. "*After B.Sc., my father forced me for B.Ed. I had developed interest – I wanted to be a microbiologist, that's why after B.Ed also, I did M.Sc. But once again I joined teaching."*

From 1997 till 2002, she taught at the Government High School at a small town, near Chintamani in Kolar district. She said that she was selected directly on the basis of merit after her M.Sc. She recalled travelling every day at 4 a.m. *"With me, the bus conductor and the driver and no one else".* She got married in 2000 and then two years later, joined GAH where she has been teaching since. Nine years later, at the time of this study, she was enrolled for M.Sc in chemistry through the Kuvempu University's distance education program. She said that she was doing her M.Sc for the sake of promotion to a higher post, or to join a college as a lecturer. She also was preparing for the Karnataka Educational Services examination. When the researcher met Vimala recently (December 2008), she was happy to inform me that she had completed her M.Sc. However, she had not cleared the Karnataka Educational Services examination.

Sharada: Sharada, 47, was the oldest of the three science teachers at GAH. She taught mathematics and physics to high school students. She and Gayatri taught the same subjects, but to different sections. She had lived in Mysore as a child and completed her schooling from St.Anne's Convent, Mysore. She had completed her PUC in 1978 from Maharani's Science College, Mysore with physics, chemistry, mathematics and biology as her subjects. She did her B.Sc in the same college with physics, chemistry and geology as her subjects. She obtained her B.Ed from Somani College of Education, Mysore in 1983 and then went on to complete her M.Ed from Mysore University. Her M.Ed thesis was titled "Evaluation of Teacher Effectiveness". Sharada was married and had twins – a boy and a girl aged eleven at the time of the research. The children studied in a private English Medium School in Mathikere, which was where Sharada lived. Sharada commuted a distance of about 14 km up and down each day.

Unlike Gayatri and Vimala, Sharada was not forthcoming about personal details and it was not possible to engage her in informal conversation. In the first conversation with the researcher , Sharada did most of the asking! Sharada did not smile easily and rarely engaged in the general conversation in the staffroom. She had a somewhat brisk demeanour and seemed to go about her tasks with a great deal of energy and purpose. On more than one occasion she chastised the researcher for not wearing a 'bindi' or a necklace and one instance insisted that the researcher wear a 'bindi' and proceeded to take one

out of her bag and place it on the researcher's forehead. She questioned the researcher for not wearing *'bindi'* or '*taali*' (necklace worn by married women) after first ascertaining that she was not a Christian. In response to the researcher's statement that she did not believe in these symbols nor consider them necessary, Sharada said *"Oh, you are national minded."*

Sharada started her career as a teacher at Government High School, Kallur Yedahalli, Mysore, where she worked from 1984 till June 1993. From June 1993, she has been working at GAH. She was also serving as Senior Assistant Head to the High School with charge of the High School when the HM was away. She often had to be out of school on duty as inspector for language and therefore when in school she was always in a rush to take more classes and catch up with teaching and corrections and seemed to be in a great deal of hurry most of the time. She also had to discharge several administrative duties, which added to her workload.

Sharada did mention in the course of one conversation that she had studied throughout in English medium institutions, but now had to teach in Kannada. According to her, the problem she faced in this was not because of language but the 'quality' of students who attended government schools.

Sairabano:

Sairabano, 48, taught mathematics and physics at Government Girls' High School, GBG. She had been teaching from 1980 and thus had 26 years of

experience. Her SSLC was from Vanivilas Institute, a Government Girls High School near K.R. Market, Bangalore. She completed her PUC also from the same institution with physics, chemistry, mathematics and biology. She obtained her B.Sc, degree from Maharani's College, Bangalore.

Sairabano completed her B.Ed training from R.V. Teacher's College, Bangalore in 1980. She began her teaching career at St. Mira's, a private English medium school in Rajajinagar, Bangalore. Two years later, she got a government appointment and was posted to Government Girls High School, Hoskote, a suburb of Bangalore. At Hoskote, the school timings were from 8 a.m. to 12 noon and this meant that Sairabano had to be in the bus at 4 a.m. on working days. Three years after starting work at Hoskote, she was married. Initially her husband objected to her working and travelling, however, since her in-laws and parents were supportive of her job, she managed to continue her teaching career. Women in the family were not expected to work outside the home.

> "I am the only female in my *khandan* [extended family] who works. One of my sisters has done till M.Sc and she does not go for a job. My sister-in-law has studied and completed her BCA, and she also has not joined any job."

About five years after joining the school at Hoskote, Sairabano had her first child, a son and then two years later, she had her second child. As they lived

with their in-laws and her own parents were also close by, the children were taken care of through their infancy till they were ready to go to school.

In 1992, after a decade of commuting long distances each day, Sairabano managed to get posted to the Government Girls High School within the city. She said that she had to put in an application three times requesting the transfer, before it was finally approved. She did not have to travel long distances each working day. However, Sairabano felt that the work was much more satisfying when she was working at Hoskote. In urban Bangalore, Sairabano felt that parents did not adequately support their children's studies. Here, only children from very poor backgrounds came to government schools because there were so many private schools. *"Everyone prefers to send children to private schools and these students get 'filtered out'."* At Hoskote, being a rural area there was a better mix of students and they performed better. However, at GBG, the inspectors expected teachers to produce results, despite the school having an intake of students from very deprived backgrounds. *"They come and shout and ask us why if a student has been attending school she could not pass*."

At GBG, when parents had been called in to see the students' marks cards, a few mothers in burkahs , spoke especially to Sairabano as she was the only science teacher who could speak Urdu. They requested her to explain science or mathematics to their girls in Urdu, since the girls did not understand these subjects if taught in English, and the other science teachers tended to

give explanations in Kannada. Sairabano listened sympathetically to these requests, but also mentioned that she preferred to explain in English or Kannada in the classroom as otherwise Tamil parents might object. She told the mothers who pleaded with Sairabano to help their daughters achieve better marks that she would explain in Urdu if the girls requested her to do so.

Sairabano did not think she wanted to continue much longer and was waiting to take retirement under the Voluntary Retirement Scheme. She had another year left to complete 25 years in government service and she was thinking of retirement then. Her husband too had been suggesting this. She said that they were thinking along the lines of setting up a private school, now that Sairabano's own children were grown up and considering that she had such a huge experience of teaching. Her older son was studying medicine at Tumkur and the younger boy was doing PUC in Bangalore.

Shivanna:

Shivanna, 45, worked as Assistant Master at GBG. He was slightly hard of hearing. During non-teaching periods, he preferred to sit away from the staffroom where the rest of the teachers had their desks. The other male teacher, Srinivasa, also did not seem to use the staffroom, which thus became a place used by the women teachers only. (The women teachers far outnumbered the male teachers in all the schools studied during this research.)

The old laboratory room had become Shivanna's den since it was no longer in use as a lab. The small room was cluttered with dusty equipment, charts, book and broken furniture and Shivanna had a table and rickety metal chair placed in a corner, where he prepared notes for his class or did other work. Shivanna taught biology and chemistry for standards VIII, IX and X and was also teaching English as a substitute teacher, since the post had fallen vacant and the new appointment had not been made at the time of this study. His duties as an Assistant Master included framing the timetable, organising the work allotment schedules, preparing the exam timetable and exam related work, such as xeroxing and filing question papers.

Shivanna had completed his SSLC from Deseeya Vidhyapeetha High School from Chikkanayakanahalli, a Kuruba dominated area near Tumkur. He himself belonged to this community, which is classified under the B category or more usually as OBC (Other Backward Castes). Shivanna completed his PUC from Government Junior College in Chikkanayakanahalli with physics, chemistry, mathematics and biology. He moved to Bellary in the North of Karnataka, where he had some relatives, to complete his B.Sc degree from Veerashaiva College in Bellary.

For two years after his graduation from college, Shivanna was not able to find any employment and took up the family occupation of blanket weaving in his native village at Tumkur. Many of his friends continue to make a living out of this. He then completed his B.Ed in 1984 from S.S.College in Tumkur

taking chemistry and biology as his pedagogy subjects. During this period, he continued his family's traditional craft of blanket weaving to support himself and continued to stay with his parental family.

In 1987, he was employed as Assistant Teacher at Gyanapeetha High School at Chikkanayakanahalli and worked part time for a salary of Rs.400 per month. In 1988, he decided to enrol for a vocational course and obtained a diploma in Opthalmic Refraction and worked as a refractionist at Siddartha Medical College in Tumkur, for a year. This was a temporary posting and the following year, he worked as temporary typist with H.M.T.,Tumkur. In 1991 he was married to a girl who was also a graduate and had a done her training in DTP operations.

In 1992, Shivanna was selected for Assistant Master's Post and Government Junior College, at Nandagudi, Hoskote, under the reserved category for Group B castes. His wife meanwhile was appointed to the AGS office in Bangalore. After working for five years in Hoskote, during which his wife commuted from Hoskote to the city, he applied for and got a transfer to GBG, in the city. His daughter was three years old when they relocated to Bangalore.

4.2.3 TEACHERS IN TUNGA PUBLIC SCHOOL (PU)

Shantala: Shantala, 31, started working at CPS at 2005, about a year before she was interviewed for this research. She had lost her husband three years ago. Her seven year old son was studying in another private English medium

school. She lived in a joint family with her husband's parents, husband's brother, his wife and their son.

Shantala completed her schooling from M.E.S. School in Malleswaram and then did her PUC and B.Sc from Maharani's Science College, Bangalore. At PUC her subjects were physics, chemistry, mathematics and biology and for B.Sc she studied physics, chemistry and mathematics. She enrolled for a course in ORACLE and visual BASIC after her B.Sc and left after six months without completing the course as her marriage was fixed. While doing her computer course, she also taught for eight months at a private school, and this too she discontinued after her marriage. She was married in 1998 and had her son in 1999. She did not try for a job as she had a young baby to look after and there was no pressing financial need at that time. When her son was three, they admitted him to the Montessori section of Kenshri, a reputed English medium school about 4 or 5 km from where the family lived.

Shantala lost her husband tragically in a road accident in 2003. Soon after, she took up teaching at Parikrma Centre for Learning, a Charitable private school run for underprivileged children. She worked from August till December at Parikrma and then enroled for B.Ed at Sanjay Gandhi College of Education in Hebbal.

After completing her B.Ed, she took up a teaching job at a private English medium school close to her home, but the remuneration at Rs.2000

per month was really quite low. The following year, she applied to PU and was appointed at a starting salary of Rs.3000 per month.

Shantala taught physics, chemistry and mathematics from standard VII to X. She said that even though she did not expect to be a teacher she enjoyed her profession. She recalled how as a child, she had often play acted the role of a teacher with her friends.

At home, Shantala and the other women took turns to cook the family meal. She was responsible for breakfast, and made enough to pack and bring to school. In the evening, it was the turn of the other daughter-in-law to cook the meal. Shantala also gave tuition to a few boys to supplement her income and "keep her mind occupied".

Shivraj: Shivraj had a somewhat reluctant entrance to teaching, after trying his hand at other jobs. In 1999, at the age of twenty one he had done his computer training from KEONICS, while still studying at the Government First Grade College in Chintamani. He completed his B.Sc in 2000 with the subjects physics, mathematics and geology. As he put it during the interview, "Initially I was not interested to teach. Unfortunately, after my computer course, I got an opportunity to work as a computer teacher. I felt, there is comfort, and satisfied with that job. One of my colleagues suggested to do B.Ed, that can permit me to join as a teacher, so after that I joined B.Ed in the year 2002."(sic) After completing his B.Ed, he found employment at a

residential school in Anekal, and worked there for six months, but was not satisfied, “In the meantime I felt that teaching job is not good for me, it is not good for my future. I cannot lead my life by teaching, by this profession, aah, by this earnings.”(sic)

Shivraj tried unsuccessfully for three to four months to find placement in a software firm and then returned to teaching. He spoke about working for about a month each in two different firms and also doing call centre training.

Shivraj had completed his secondary schooling from a government school in Sugutur in Kolar district. After this, he went on to do his PUC at the Government Junior College, Srinivaspura, Kolar. He said that his parents had wanted him to do a teacher's training course, TCH, immediately after PUC since that would mean that he would find employment as a government teacher, particularly if he became a *“science TCH”.* As Shivraj was not interested in working with young children, he did not listen to his parents' wishes and enrolled for his degree, at the Government First Grade College in Chintamani.

While at college, Shivraj recalled being involved in an intercaste conflict which seemed to have started with something quite trivial. Shivraj half jokingly mentioned that he had had an arrest warrant on his head.

When he was at college he felt that he might want to work as a lecturer, an ambition that Shivraj had not given up even as he was working in the private school. After his unsuccessful attempts at finding suitable

employment with private firms, Shivraj joined a private high school at Bayalgunte where he worked from 2003 till 2005. In 2005, he joined the private school that was studied in this research. Shivraj had enrolled for an M.Ed degree with the Karnataka State Open University while working at Tunga Public School (PU). About a year after starting work at this school, Shivraj got married. His wife was also a teacher at another private school in the same area. He said that he was hoping to join a B.Ed college as a lecturer. The trust that ran Tunga Public School was also running a teacher training college. At the time of field work for this study, Shivraj was also preparing for the state selection exam for recruitment of high schoolteachers, which he eventually sat and cleared. He was subsequently posted to Gulbarga.

4.3 REASONS FOR CHOOSING TO TEACH

Teachers who taught science at the elementary level which includes the VII standard, and those who taught at the high school level differed in their levels of education. Elementary school teachers in government schools were not required to have a graduate degree, and therefore in both the government higher primary schools that were studied, the teachers who taught science, like most of their other colleagues had passed their SSLC (secondary school examination) and TCH. However, in the private and international schools, the teachers who taught science at the VI and VII standard had completed

graduation. Consequently the career opportunities as well as aspirations were different in the case of graduate and non-graduate teachers.

There is no obvious way in which people could be said to choose to become teachers. In preliterate or caste societies, it may have been relatively easy to predict what work an individual would do, given his caste or family background. But in present day societies, there are several occupations that men and women could choose from.

> "… the way an occupation fits into the competitive recruitment system will affect its social composition and its inner life. Occupations compete, consciously or not, for members, and there is a largely silent struggle between occupations, as individuals choose along alternative lines of work. Occupations proffer different advantages and disadvantages to those making choices, and people vary in their dispositions and personal circumstances – an occupation will attract some persons and repel others. Out of the combinations which ensue, an occupation will come to be staffed by people of particular disposition and life circumstances." (Lortie, 1975 p.25)

Over the course of interactions, the themes that emerged explicitly as reasons for individual occupational choice in the schools studied were the following:

- Interactions with children

- Teaching as a special mission
- Suitability for women
- Men teachers' career choice and why men choose teaching careers
- Opportunities for learning
- Income

4.3.1 INTERACTIONS WITH CHILDREN

Individual teachers from the different schools studied, expressed that one of the main reasons for choosing to teach was the opportunity this provided them to interact with children. Interactions with children and/or young people are one of the most obvious characteristic of teaching. Very few occupations other than teaching involve protracted contact with young people. Of the teachers interviewed in this study, 70 percent explicitly cited interaction with children as one of the reasons for choosing teaching as a career.

Vijaya (GAP) who worked at the government model primary school, in response to enquiry about her reasons for choosing to teach, said, *"I like children — teaching children."*

Shanta (GAP) who worked in the same school also said that she liked teaching children. Vimala (GAH) who worked at a government high school mentioned the attractions of working with adolescents very cogently.

Vimala: *I like the profession very much. Because it is a learning process, along with students I learn and also I can enjoy with young people rather than files, or dealing with adults.*

Vimala was specific about the age group she felt most satisfied about teaching:

> "Adolescents (are) very good for teaching. Very small children — it is playing period (stage) for them rather than understanding. In the high school, moral development takes place. They dream of the future. Even we remember our high schoolteachers rather than our college lecturers. We can shape them up. I want to create love for education and want them to continue — especially girls — they will be getting married and then if things go wrong only education can help them be on their own feet. Main thing, I enjoy it very much. Every day new problems, new solutions. Sometimes I get a sudden reaction!"(sic)

When asked to explain she continued: "What can I say? They show affection — it is spontaneous, not on demand — suddenly it comes. Sometimes even after we scold children in the class, they again come to me. They give unconditional love — that I like." (sic) As she spoke her eyes filled with tears. *"Sometimes, after many years, they come back. A boy from my old school came in search of me. Like that they come in search that is a great pleasure."* Vimala mentioned the need to give motherly treatment to the students. She herself was childless.

Savita (GBG) who worked in the girls' government high school said she liked teaching because she could create enthusiasm among students.

Sheela (PI) who taught standards VI to VIII at the international school had moved to teaching from her earlier work as a programmer. Sheela had a degree in Engineering and said that both during her college days and when she worked for a software firm, she had done voluntary work for an AIDS awareness campaign. This work had involved counselling adults as well as children and she found that she liked interacting with children and wanted to continue. She didn't enjoy her work as a programmer and decided to move to teaching and the school was ready to train her in this area.

Two teachers Shantala (PU) and Shivraj (PU), who worked in the private school, had not originally thought of careers in teaching. However, they too mentioned that after they entered the profession they liked teaching because they liked the interactions with students. Shantala said, "I never thought I would be a teacher. I like this job, it helps me to keep busy and my mind occupied and I enjoy with children."

Referring to the loss of her husband, after which she took up teaching, Shantala spoke of developing a liking for the profession. She spoke about how her daily interactions with children kept her from getting depressed about her widowhood. While talking about this, she also reminisced about her own childhood. She seemed to imply that working with children reminded her of

her own childhood and linked her present choice of profession to the playacting in her younger days.

> "From childhood I imitated teachers and I liked this profession- somehow I never thought I would become a teacher. Somehow circumstances made me come to this profession and I like this profession. I don't want to change it. It keeps my mind also occupied... even though I am facing many difficulties and problems I enjoy this, it is keeping my mind also busy." (sic) (Shantala)

Shivraj had, in fact, tried working at several jobs. While he was working as a contract computer teacher, he felt satisfied with his work and felt he could teach. He later enrolled for his B.Ed at the behest of a friend.

Lortie (1975) writes that interactions with young people is a major factor that attracts people to choose this profession. Both women and men teachers expressed similar positive feelings about working with young people. While several women teachers explicitly cited this as their reason for choosing the teaching profession, the men did not. Among the male teachers, both Shivraj (PU) and Shivanna (GBG) had tried other jobs, before settling into a teaching career. At the time of study, Shivraj while working at a private school was planning to take the selection exam for joining government service as a

high schoolteacher. In the second year of the study, Shivraj succeeded in his attempt, and was posted as a high school teacher to Gulbarga.

Mohan (PI), who worked at the international school, said that he had moved into teaching, because he found the field work involved in his previous job as a wildlife biologist taxing on his health and also affecting his family life. He found his present work satisfying as he enjoyed working with young people and could use the classroom to discuss environmental and conservation issues that he was personally committed to. Although teaching was not the men's first choice of career, they noted that once they entered the profession, enjoyed it because of the interactions with young people and therefore, they continued to teach.

4.3.2 TEACHING AS A SPECIAL MISSION

While discussing the various factors that make people take up teaching as a career, Lortie mentioned the "service theme". Teachers have been perceived as performing a special mission in society(Lortie, 1975, p. 28).This notion is echoed in the ideal of 'guru'. The set of attitudes, values and expectations associated with the teacher is symbolised in the Indian tradition by the word Guru. This Sanskrit word, the use of which goes back more than 2,500 years, has a broad spectrum of meaning-from the teacher in the pedagogic sense to the spiritual guide and mentor (Kale 1970). In her study of high school teachers in Pune, Kale wrote that some of the teacher respondents saw teaching as a noble duty comparable to that of the *guru.*

Among the 24 teacher respondents of the present study, only one, Shantala (PU) explicitly referred to the notion of teaching as a special mission:

> "Everyone knows teaching is a noble profession. It is respectable profession and it is responsible for the uplift of the country – indirectly, like, the students are the future citizens and we are moulding them in such a way that they become good citizens. It gives satisfaction also... this profession lets us be responsible for the uplift of the country. Like, indirectly, we are given a chance to bring the country to a higher position by building the children." (sic)

Shantala seemed to be saying that the notion of teaching being a noble profession was common place. She referred to the importance of the profession in nation-building. Sarangapani (2003, p.115) in her study also found that school teachers presented themselves as patriots who were responsible for instilling moral values in children. However, none of the other teachers in this study referred to this notion explicitly and it is not possible to say whether this notion was actually held by them since this research did not specifically seek to probe this idea.

4.3.3 A Career Suitable for Women

Although teachers, both men and women, stated their liking for working with children or youngsters as sources of satisfaction in their profession, not all

women teachers cited this as the main reason for choosing a teaching career. They spoke instead of family pressures to choose a career that was suitable for women or of choosing an occupation compatible with their roles as mother and wife. The choice of teaching as a career or job thus appeared to be based on a multiplicity of reasons. All the women teachers who were respondents in this study alluded to teaching as a job that allowed them to balance their responsibilities at home and at work, but this reason was not mentioned by any of the male teachers in this study.

Arati (PU), who taught biology at the high school level said.

> "I did my M.Sc. and B.Ed and worked for one year teaching (before getting married). I like teaching and thought that you cannot teach without B.Ed. I had no idea that I could work in agro-based company. If we have to do night shift far away from the house, or work in some lab far away then how to manage? Food, health and education of my children are most important to me in the world." (sic)

She was teaching at the private school and subsequently discontinued, in 2007, the second year of this study. One of her stated reasons for discontinuing was "tension at home – too much work - keep food ready also and coach my son for his studies also, and mother-in-law is not cooperative." (sic)

Arati's choice of occupation represented the element of constraint in the decisions of some women who chose teaching for its compatibility with

marriage and child rearing. The reasons she articulated, represented the reasons that account for the fact that many women who could have opted for alternate career choices ended up in teaching. This appeared to be especially true for women teachers in secondary schools, as they were graduates and science graduates had the option for going for further studies and choosing careers in research or in colleges and universities. Savita (GBG) and Girija (GBG), both of whom taught at the government girls high school, opted for teaching after getting married and moving to Bangalore from their native villages in North Karnataka. Savita did have an opportunity to work in a statistics department of a government office, but preferred teaching. She said that by working at a school, her work timings and holidays would coincide with those of her school-going daughter and she could manage house work and job more easily.

Meena (PI), Maya (PI) and Arati (PU) were post-graduates and had worked in private schools, changing work places several times as they followed their husbands' career geography. Changes in work place occurred seven times in the case of Meena and four times in the case of Arati. Both women have remained in teaching, but had to move from city to city with their husbands. Primacy was given to the husband's career and the women kept adjusting to new school environments each time they moved. In Meena's case, career breaks had also occurred due to responsibilities related to child-birth

and family illnesses. Both women were married when they were in the final year of their M.Sc programs.

Women teachers in this study considered teaching at school as a job compatible with marriage and child rearing. Maya had been working for a doctorate, giving it up to bring up her baby daughter. Maya, in an e-mail communication with the researcher wrote,

> "I was in research and wanted to pursue a PhD. I gave it up because I was away from my very young baby - 7 months then.
> Thought I would return later.
> 2 years later i decided to go into teacher training because I wanted to have only one child and therefore decided that I should spend quality time with her.
> [I] Started working when she started schooling.
> [I] HAVE ABSOLUTELY NO REGRETS!!!!!" (quoted as in the original)

In some families, if the daughter was an academic achiever, the only career considered suitable for her was teaching. Sairabano (GBG) mentioned that she was the only woman in her extended family who worked outside the home. Neither her sister who had done her M.Sc, nor her sister-in-law who had completed her Bachelor of Computer Applications had taken up a job. Sairabano had support from her parents as well as in-laws to continue her job as a government high schoolteacher, and could thus resist her husband's wishes that she give it up. In some cases, family support for a woman's career aspirations may be restrictive, as in the case of Vimala (GAH):

> “First I didn't want to be a teacher. But my father forced me. After B.Sc I developed an interest in microbiology. That's why even after my B.Ed, I also did M.Sc. But once again I joined here. (Government high school)”

Notions of impossibility, tension and contradiction in the experiences of women teachers are richly documented in literature from North America and Europe. Walkerdine (1990) refers to the 'impossible fiction' of being a woman teacher in today's society, to the tensions and contradictions that are inherent in an identity that asserts power, status and commands respect (teacher) at the same time that speaks of subordination, marginalisation and repression (women). Kirk (2008) in her study of women teachers in Pakistan wrote about three distinct reasons that seemed to coexist. First, there is the notion of teaching as a noble profession as articulated by Shantala (PU) (see also Kale, 1970). This notion may no longer be held quite as strongly as it was some decades ago, nonetheless, the notion clearly retains some value and may be an account into which women invest and gain an important sense of the significance of their work. The second reason was the belief that was articulated, particularly by women teaching at the elementary level, that they will be able to teach younger children. This reflected a common perception that women are pre-disposed to working with younger children and therefore particularly suited to primary school teaching. As feminist scholars have

critiqued, any 'comparative advantage' that women may have in caring for young children is a somewhat problematic, essentialising discourse (Elson 1992) that can become a means of limiting the range of professional opportunities open to women. “Taking up and enacting such a discourse may, on the one hand, represent an act of agency for individual women, inserting themselves into a professional domain that does command some respect and status. Yet, it remains an agency that is circumscribed by traditional gender roles” (Kirk 2008: p 65).

The third reason for becoming a teacher expressed by several teachers, is one of family expectations and perhaps limitations; teaching is clearly an acceptable profession and one into which women are encouraged.

In the case of government primary school teachers, teaching was seen as the only suitable way for a girl to earn. Often family circumstances made it necessary for the girl to bring in an income rather than study further, but family values restricted the girl’s choice of occupations. After completing secondary school, teaching in a government school was seen as a respectable and desirable choice of livelihood, especially for a girl.

Shanta (GAP): *Teaching is very good, suitable for women.*
Vijaya (GAP): *I did not consider other jobs, I did training and joined this job only.*

These three ideas – (i) of teaching being a noble profession; (ii) of the work being in accord with women's natural abilities and (iii) of being a career that was aligned with family expectations – contain inherent tensions between them and could be understood as a reflection of the tensions between quite different perceptions of women teachers in the given context. "For the woman teacher, they are all three very viable discursive resources from which she constructs her story of becoming a woman teacher" (Kirk 2008: p.66)

All the women teachers described teaching as a career that was compatible with the heavy family and household commitments that most women deal with everyday. Women teachers were able to work at school and then return relatively early to organise the food and the home for the evening. Rather than a specific vocation to be a teacher, it may be the realities of family expectations and household commitments which channel a woman into the profession.

The narratives of women teachers point to the situation that many urban women may be in, of needing and wanting to contribute to the family income and yet, as a woman, only able to do so in certain socially acceptable ways. Teaching may be considered a suitable profession, one that could be combined with other responsibilities. The narratives of teachers from different schools were essentially similar in this respect. There were minor variations in the narratives. Interestingly, Shanta (GAP), Vimala (GAH) and Sairabano (GBG) who were teaching in government schools spoke of parental pressure

as being instrumental in their career choice. Arati, Meena and Maya who were working in private schools mentioned that they had self selected their careers as it helped them to combine their career and maternal responsibilities.

4.3.4 MEN TEACHERS' CAREER CHOICE

Of the five male teachers (including the principal of a private school) who were respondents in this study, it could be said that they had decided to become teachers only after they had tried another line of work. These instances could be said to be constrained in the sense that those involved had invested in an alternative and found it unsatisfactory.

Shivraj (PU) spoke about his initial unwillingness to teach and of resisting his parents' suggestion that he do his teacher's training after high school in order to qualify for a government position in a primary school. Shivraj did not like the idea of teaching in a primary school, preferring instead to consider teaching as a lecturer in a college. After completing his B.Sc, he did computer training with KEONICS, a government of Karnataka enterprise and hoped to join a software company. This however did not materialise and he took up appointment in a school and found that he was comfortable with teaching. After this first stint at teaching, he decided to again try for jobs other than teaching, even employment in private firms. He enrolled for Call Centre training, but did not get a job in this area; next he tried being a salesman with Eureka Forbes, and then went back to teaching in a private school.

Shivanna (GBG) had trained and worked as a refractionist, then typist, before getting appointed as Assistant teacher at a government high school. Basavaraj (PU), who was serving as the Headmaster of the private school, and who also taught biology for the X standard, narrated his own career path and his move into education. He had worked in a bank and was posted to a remote area where the dust caused serious respiratory problems. Since he had done his B.Ed and also his M.Ed, he decided to take up a career in education and joined the private school. Perhaps the fact that he belonged to the same caste group as the members of the trust that ran the school weighed in his favour while seeking employment as Headmaster of the school.

Thus, it appeared that the stated reasons for men and women entering a career in teaching were different, leading to different orientations towards their professions. Hilary Burgess (1989) has pointed out that while teaching is a good job for a woman, it is a career with prospects for men. If one considers the case of the primary level teachers who were respondents in this study, this is borne out. The only male primary school teacher who was a subject in this study was Manjunath (GBP). He had recently obtained a posting to the Government Higher Primary School in a prime location in Bangalore and mentioned the number of schools, he had managed to get posted to keeping in mind his active involvement in the Karnataka Primary School Teachers' Association. Manjunath talked with animation about his involvement in various state level events and about not finding the time to teach. He had

changed his workplace seven times. In contrast, the maximum number of changes of position in the case of women primary teachers in this study was three, and in most cases, it was only two. This reflected the women teachers' preference for settling into a predictable routine after their request for an urban posting had been granted and concentrating on managing the twin responsibilities of job and housework rather than actively seeking career enhancement. Further aspects of career and professional development of teachers have been discussed later in this chapter.

4.3.5 Opportunities to Learn

Forty percent of the teachers spoke of opportunities to learn, and learning itself as one of the key areas that gave them satisfaction in their work. Complementing this was the dissatisfaction expressed by teachers when they felt that they were teaching a subject or an area about which they themselves were insufficiently knowledgeable.

In the case of primary school teachers, there was no obvious reason for a teacher to particularly opt for teaching science at the VII standard. Science was not taught as a separate school subject till the VII standard. Teachers who had the teachers' certificate, TCH were expected to be able to teach all subjects till the VII standard. However, in actual practice, teachers mutually decided about their roles and responsibilities with respect to who taught what. Taking up the responsibility for teaching science was considered by Shanta (GAP) as

an opportunity to learn more about a subject she might have studied had she been allowed to study beyond secondary school.

> Shanta: *Had I been allowed to study, I might have gone for science. Those days, my father did not allow me to study more. If I did B.Sc, an M.A/M.Sc boy would have to be found (for marriage). He said I have made you complete TCH. That is enough!*
>
> Shanta (explaining about choosing to teach science): *When the new textbooks came, nobody wanted to teach science for the VI or VII. I said I will do it. In the public exam, all my students passed, [all] did very well, almost everyone got above 50 percent.* (smiled as she recalled).

Lortie (1975) writes about psychic awards being an important part of the total rewards received by classroom teachers. In the case of Shanta, she was explicit about the satisfaction she derived from her students' performance and her own role in successfully rising to the challenge of teaching science to the VII standard. Teachers explicitly mentioned learning as a positive aspect of their work as teachers.

Shantala (PU): “We are also learning. Some basic concepts in math I learnt because I had to make children understand. In school, we had not been taught these concepts – now I can understand better these concepts”.

Shivraj (PU): “Teaching is learning. Degree is for marks.”

Savita (GBG) spoke about her preference for teaching over another job and mentioned that teaching offered the possibility of learning new things.

Vimala (GAH): “I like the profession very much. Because it is a learning process, along with students I learn*”.*

Shivanna (GBG) mentioned how interesting he found the new textbooks: *“If you look at the IX standard chapter* (pulls out the textbook to show the researcher) *on control and coordination; it is very vast and interesting, they almost go up to the medical college level. See, they have explained about thyroid gland, other hormones.... I learnt a lot of new things after reading this book – very interesting.”*

All these teachers explicitly mentioned the learning opportunities their work presented them and expressed that they found it interesting to come to a deeper and wider understanding of the subjects they taught. Shanta was able to pursue her interest in science through teaching since she was not able to take up higher studies in the subject.

4.3.6 INCOME

Though only a few teachers explicitly mentioned the monetary compensation or the lack of it in connection with their work, this is an area that needs to be considered. It is worth mentioning that teachers in the government schools and those in the international school did not mention dissatisfaction regarding their

salaries, however, this issue came up in the case of several teachers working in the private school.

The difference between women teachers in the government school and those working in the private school, was that while government school teachers clearly expressed their intention to continue in the profession till retirement, the private school teachers' teaching careers seemed much more contingent on relationships outside work. These teachers mentioned occurrences in their husband's lives, such as changes in employment (including changes in workplace), increases in husband's income and increased family responsibilities like looking after an aging relative as possible reasons that would make them move out of teaching. Women teachers also mentioned child-birth as reasons for taking a break in their jobs. Women may enter expecting to work for a short period before marriage or childbearing: they may or may not plan to return later.

High school teachers at the private unaided school (PU) were paid Rs.3000 in 2006, whereas teachers in the government school were drawing salaries of Rs. 10,000 or more depending on their seniority. Teachers at the international school (PI) were paid salaries varying between Rs.12, 000 and Rs.20, 000, according to their experience and qualifications. Since salaries in the private school were less than half of those in the government school, the loss of income on leaving the job may not be a major factor in their decisions to stay in teaching or not. Shivraj (PU), the male physics teacher at Tunga

High School, repeatedly spoke of his low earnings as a teacher in a private school and his plans to study further in order to work in a teacher's college and also his intention of sitting for the government selection exam for teachers, since either of these two positions would offer him better monetary compensation. At the end of the first year of the study, two of the science teachers, Arati and Shivraj left – Arati chose to discontinue her teaching career and stay at home to help her son with his studies, while Shivraj successfully cleared the Karnataka state selection examination for high school teachers and was appointed to a Government high school in Gulbarga district.

In another instance, teachers at the private school were writing into the autograph books of the X standard students and also commenting aloud on what other students or teachers had written into these books. On reading a student's stated ambition "want to become a teacher" in the autograph book, Savitri (PU) said *"Which idiot has written that?"* When probed about this, Savitri clarified that she was surprised that any student would want to become a teacher. Savitri felt that the student must have been ignorant of the realities of a teacher's life where the work was hard and the pay was low. In response to this, Shivraj mentioned that in rural areas, several students aspired to be teachers as this was the only government job that they knew of and could see a their way into. Arati in the same school also mentioned her great dissatisfaction with the salary she was getting. Six teachers from this school wrote the government selection exam for teachers and four of them got

selected and were able to move out of the school into the better paying government system.

> "Occupational choice is an either or decision where one decision rules out others, most likely permanently" (Lortie 1975, p. 33). Economists use the concept of "alternatives forgone" when they apply the framework or "rational choice" in the case of people choosing occupations. The concept could be extended and any given selection can be thought of as more or less subjectively costly to individuals and categories of individuals while taking into account the aspirations set aside when, for whatever reasons, they enter a given line of work. While transposing this idea into a social psychological definition, it is not necessary to assume that rational choices were made or, in fact, that the sacrificed aspirations were indeed assured. According to Lortie (ibid.), it turns out that entering teaching is subjectively more costly for men than for women. This certainly appeared to be the case for men and women teaching in the urban schools in this study.

For women, the alternatives seemed to be weighed against upsetting the balance between career and home, whereas for men it was a question of choosing between careers with greater prospects of earning and, to some extent, prestige. Speaking of the gendered nature of choices regarding teaching, Lortie (1975) said,

> "Men and women react differently to the nature of the career line. The steps upward within teaching are too small to satisfy the ambitions of most male entrants; they want greater rewards associated with administrative positions. But the gentle incline of teaching fits the aspirations most women bring with them; it facilitates their "in – and – out" plans. Absence would be costlier if teaching careers were staged; the re-entering teacher would have lost more in comparison with those who stayed on and moved into higher statuses. Under the present system, the major cost is the loss of incremental earnings, and for most married women this is probably not perceived as serious. (Married women might be expected, therefore, to resist moves to stratify teaching careers.) We also note that "in-and-out" rests on the assumption that no major technical changes are likely to take place while one is absent; so married women may also (consciously or not) have a stake in slow rather than rapid change in teaching technique." (p. 88)

However, in the context of the schools in this study, the above analysis would seem to apply more specifically to private school teachers on low wages. Government school teachers were unlikely to have an "in-and-out" approach. Eleven of the fourteen government school teachers in this study had been serving for over ten years at the same school (Table 4.1).

Lortie also mentioned that the special mission of teachers gave their occupation a standing somewhat higher than we would expect solely on the basis of income. Teaching is clearly white-collar, middle-class work, and as such offered upward mobility for people who grew up in rural or working class families, including Shivanna (GBG), Shivraj (PU), Shanta (GAP), Vimala (GAH) and Gayatri (GAH). However for urban middle-class women, the move into teaching was a result of constraints imposed by the families and society. It was more likely that women would stay on in low paying private school jobs in order to balance their career aspirations with their roles as mothers and wives. The marginal utility of an additional salary is greater for women than for men as in typical middle-class urban homes, the women's incomes are considered of secondary importance compared to the incomes of their husbands. When faced with a choice between higher income and longer work hours versus lower income and a somewhat shorter workday, women were likely to opt for the latter for reasons very similar to those articulated by Arati. As Lortie wrote, "it seems, then, that the social rank of the occupation recruits differentially among men and women, producing recruits of somewhat different social class backgrounds (1975: p. 36)." The acceptability of the occupation for women of higher social background also facilitated their entry.

What was interesting is that these women tended to work in private schools that had a student population of a higher social background, similar to their own rather than work in government schools where the student

population is pre-dominantly, if not solely, representative of the lower social background. This class differential between the teacher and the taught has consequences in terms of the attitudes and beliefs that teachers have about the students they teach.

4.4 PROFESSIONAL DEVELOPMENT

The affiliation with formal learning and acquiring further academic credentials is also reflected in the aspirations for further professional development of teachers, especially in the case of high school teachers.

However, the government primary school teachers with 20 or more years of service experience did not have further career aspirations and apart from hoping to be promoted to Headmistress post, they did not express any specific career aspirations. An explanation for this could be that the teachers think of teaching as a terminal status. Given the lack of a clear incentive structure and very few opportunities for career development, perhaps it is not surprising that they did not invest personal resources like time or money to take up further education.

In contrast to the government primary school teachers who were respondents in this study and who had put in several years of service, young teachers in the private school with similar academic qualifications seemed to be actively seeking to further their academic credentials and also were open to career moves that would enhance their salaries. However, being women, these

teachers also had constraints related to family and husbands' place of work that restricted their choice of careers.

In contrast to the government primary school teachers, high school teachers in all the school types studied spoke of further career plans. Vimala (GAH) and Shivraj (PU) were actively engaged in adding to their academic credentials which they expected would lead to further advancement. Vimala was studying for an M.Sc degree in Applied Chemistry from Kuvempu University and spoke about needing to develop her knowledge base in the subject in order to teach it with more confidence. She was also preparing for the Karnataka Educational Services (KES) examination which was conducted for recruitment to the Karnataka Department of Public Instruction. Vimala also spoke of possibilities of enrolling for an M.Ed degree and expressed an interest in getting a doctorate degree like this researcher. A year after the field work for this research was conducted, during a chance encounter, Vimala informed this researcher that she had successfully completed her M.Sc. degree, but had not succeeded in her KES examination. Sharada (GAH), who already had M.Ed qualification, on the other hand, spoke of the impossibility of doing a Ph. D degree, as she had her twin children to bring up in addition to her job. However, in terms of career. she was upwardly mobile, having additional responsibilities of subject inspector, high-school in-charge and serving as external examiner for the B.Ed candidates who came to the school for practice teaching. Sairabano (GBG) and Savita (GBG), both had spoken of

wanting to acquire a master's level qualification and not being able to manage it, given the multiple demands on their time as they managed work and household responsibilities. Sairabano had in fact completed one year of M.Sc mathematics from Osmania University before discontinuing it. Srinivasa (GBG), a male teacher, was expecting to be promoted either as a Block Education Officer or as the Vice Principal of a government high school. Maya (PI) was considering opportunities to work as principal after several years of teaching biology at private schools and was working towards a Masters in Education (Educational Management) from the University of Bath, United Kingdom through the distance mode from Oxford Brookes University.

Thus, there were, among teachers, those who were content with their work situation and looked upon their present work places as stable environments in which they would continue for several years and those who were actively planning and working towards career moves. This was true of high school teachers in all the three school types studied. In the private school, where salaries were low, several teachers were seeking to sit the government selection test for appointment as teachers in government high schools. However, the teachers who were planning to do this were either male or single females. Married women teachers, on the whole, preferred working at locations of their choice, even if it meant poor salaries, rather than having to risk getting posted far away, if appointed as government teachers.

4.5 TEACHERS' AND THEIR WORK

The chapter on schools has provided descriptions of the typical school day in different schools that formed part of this study. What has been attempted here is to offer a description of the work and working conditions of teachers in the different schools.

4.5.1 WORKING IN GOVERNMENT PRIMARY SCHOOLS (GAP, GBP)

In both the government primary schools studied, there was only one male teacher and the rest were women. In the case of women teachers, the working day would have started well before sunrise. Before coming to school, she would have cooked the family breakfast, packed several lunch boxes, depending on the size of the family and then rushed to catch a bus to travel anywhere between 10 to 90 minutes to school in time for the morning assembly which started at 8:40a.m. Assembly meant that the teacher had to line up her class and possibly other classes if some colleague were absent and get the children to stand in a semblance of order in the school grounds. Children would continue to chatter as they stood in line for assembly. More would keep arriving and join the line, well past the start of the assembly. Sometimes a younger child would be brought by a mother or a grandmother who would also join the throng on the grounds and strike up conversations with other parents or students even as the morning assembly was in progress.

At the beginning of the term or at times when teachers had to undertake tasks such as voter verification lists, there would be a sizable crowd

of parents in the school seeking information from the teachers. At 9:20, a teacher would tell a student to strike the bell, signalling that lessons for the day should start.

Several coping strategies have been developed by the teachers to deal with the various contingencies, bureaucratic demands and inspections. At the model primary school, standards VII A and VII B were the first classrooms that one saw next to the HM's office in the front of the building, though these had signs saying standard III and IV over their respective doors. On inquiring, Vijaya(GAP) said, *"We put the older students here, younger ones keep running out. It doesn't look good, when officers come. When we leave the class or the HM calls, the younger students will run out – it looks odd."* Standards II, III, IV and V were in the row of rooms behind the front row of classrooms, so that even if the children were noisy or running in and out of the classrooms, it wouldn't be immediately noticed by the inspector. Standard I was in a separate room all by itself to one side of the main row of classrooms. The door of this room was usually closed and the children held within, except during breaks and lunch time. This class was tremendously crowded, with 70 or more children controlled by a single stick-wielding teacher aged about 50.

In this school, none of the classrooms had benches and children sat on the floor. So the teachers had to get the classroom swept, which they did by invariably instructing one or two girls to do the sweeping. Whenever there was a manual chore to be done, the teachers would call upon a student to

perform it. Girls were made to sweep and on occasions mop the classrooms, but not usually sent on errands outside the classroom, like fetching chalk or the attendance register. Since the school had a toilet for girls, girls had to fill water in the storage tank by fetching it in pitchers from the hand-pump outside the school compound. Fetching water was thus seen as a chore for girls even if it entailed going out of the school. However, apart from fetching water, girls were not sent on errands that required them to leave their classrooms. These errands were done by the boys. Boys were also sent on errands out of the school when tea had to be brought for visitors or when question papers or transfer certificates had to be photo copied. The teacher whose classroom was to be observed would invariably send a boy to fetch a chair. On some instances, when the researcher brought a chair into the classroom, the teacher in charge of the class expressed surprise. This pattern of having students do manual chores around the school was observed in the government high schools (GAH, GBG) as well.

At, GAP, the older structure to one side of the main building was not in use as some of the roof tiles had disappeared and the floor was cracked. However, there weren't enough rooms for the high school and junior college located in the same compound. Classes for high school were held in the dilapidated wing of the primary school, and at times, teachers of the primary school squeezed two sections into one room to accommodate the high school class in one of their rooms.

On some occasions, teachers who were present had to manage several classes together as other teachers were on leave. On such occasions, student leaders appointed by the teachers took over the role of maintaining order in an unsupervised class and behaved in a style that closely mimicked the teachers, by using their voices and occasionally the stick to control their peers. During the period of study, on two occasions, a number of teachers were absent: once when several teachers had gone together to attend a wedding of a colleague's nephew and the second time, when several teachers were away verifying the voters list. As per the policy, teachers were supposed to do verify the voters' list on weekends and not on school days, but in practice several teachers expressed resentment at having to work on weekends and completed the verification during school hours.

During the school day at the model school, teachers were scheduled to take classes continuously and could only snatch moments of much needed respite by gathering in the headmistress's office for about 15 minutes after lunch while the student leaders ensured that students were seated within the classrooms. During lunch, the pre-cooked food that had been supplied to the school by an external agency had to be served, and the teachers took turns doing this. It was customary at this primary school for each teacher to mark the successful completion of a cycle of tests each trimester by offering tea and bananas to their colleagues and these became additional occasions when teachers gathered. Invariably, one or two older boys would be sent out to get

the tea and the fruit. In all, the researcher witnessed eight of these get-togethers in the academic year 2006-7.

In the other primary school (GBP), the science teacher Manjunath was active as a member of the teachers' association and was hardly around to take classes. However, he had managed to get an extra teacher deputed to the school. He had also organised to get new classrooms built in the school and these had been provided with benches and tables by a local charity. A posting to this school would have been a coveted one as the school was located in a convenient part of the city well connected by buses. However, the number of students enrolled in this school was about a quarter of the number enrolled at the model primary school (GAP) and the number of sanctioned teachers' posts for this school was three. Two additional teachers were on "deputation" to this school, a sign of Manjunath's ability to work the system. Except the headmistress, the other teachers commuted short distances to reach the school and one of them lived within walking distance of the school. This teacher had been serving for over 12 years at another school in the same locality and had herself applied for a transfer to this school fearing that she might be posted to some remote rural school. Teachers had thus 'managed' their postings to accommodate their family situations. Teachers in this school often adjusted to each other's needs to be out of the school on personal work by combining two or three standards together for teaching.

Teachers at GBP spoke about the students negatively, saying that these children were at the government school because they were unable to join the private schools. These teachers echoed the common sentiment of government schools being the least preferred option in urban areas. Some of the students mentioned to this researcher that their parents had sent them to this school as the teaching at this school was supposed to be better than in the government school closer to their homes. This would indicate that even though parents were not in a position to send their children to private schools, they were choosing to send their children to better performing government schools. In some cases, this entailed long bus journeys for the child to attend a better government school.

In addition to the mid-day meal supplied by an external agency, students in the GBP were also provided milk and biscuits on Saturdays by a religious charity and teachers were required to assemble the children and sing religious hymns every Saturday morning. Teachers seemed to do this without much overt resistance or questioning. This appeared to their general approach to carrying out all the orders they received.

What follows is an illustrative list of contingencies and interruptions to their teaching lessons that teachers in the primary school, GAP, were observed to deal with, over a period of five months. This list is not exhaustive as the researcher was present in the school sporadically.

August ‘06

- A new girl was brought into standard VII about two months into the term and in the middle of a teaching period. Shanta tried unsuccessfully to suggest to the headmistress that the new student who had come from Andhra Pradesh would not be able to cope with Kannada language.
- Teachers gathered at the Headmistress's office for about an hour to felicitate a colleague's appointment as a Cluster Resource Person.
- Shanta, Vijaya and Ravindra along with students of VII standard had to go on an enrolment drive to a colony of migrant labourers about a kilometre from the school. They went from shelter to shelter in the shanty town trying to convince reluctant mothers to enrol their children in school.
- A bridge program in a "tent" school was started for the migrant children and Shanta and other teachers from GAP had to oversee this in addition to their routine teaching load.

October '06

- Shanta and the HM had to take stock of the damage to the roof, doors and windows caused due to vandalism during the Dussehra break.
- The charts had been torn off the classroom walls and new charts had to be put up in case visiting officers/inspectors made an adverse remark about Shanta because of this.

- Vijaya received a memo from the HM asking her to attend a training program the same day. This training program required an overnight stay and so Vijaya planned to take casual leave to avoid going for this program.
- Standard VI and Standard V have to be seated together several times this month as one of the classrooms has been occupied by some IX standard students from the high school. The high school class was being taught by a B.Ed trainee.

November ‘06

- Teachers and students of primary schools had to return after reaching school because an unscheduled holiday has been declared following the state level event held to mark children's day. Because of this, the headmistress had the additional duty of escorting back some girls to their orphanage as they too had arrived in school. The government schools did not have a telephone.
- Five teachers of the model school went on casual leave together to attend a colleague's nephew's wedding. The headmistress had to manage the school on a skeleton staff.
- An all teachers' meeting was announced for the following day one afternoon, this meant that teachers would have to come and engage students for half the day and after the mid-day meal send the children home and go for the block level meeting.

- Senior teachers like Shanta and Vijaya were called to the HM's office to deal with an incident concerning two boys of the school who had been brought to the school by a local shop keeper who had grown suspicious at the amount of money the boys had been spending. About 20 people from the surrounding houses were gathered in the office. The issue was swiftly dealt with by sending the boys home and asking them to return with their parents.

December ‘06

- D.Ed students came to take classes for their training practicum and this allowed the regular teachers to escape their teaching duties for about two weeks.
- The HM and two teachers had to manage the whole school for about two weeks while the other teachers were busy on voter verification duty.
- For a week following the voter verification work, on several occasions during the school day, parents would walk in asking to see if their names were on the list and trying to ensure that they were enlisted as voters in the appropriate ward.

Neither of these primary schools had a designated staff room. At GAP, teachers gathered for about 10 minutes in the HM’s office room twice a day – at the start of the lessons and after lunch. They ate their lunches in the room

used to store the utensils and other items after the mid-day meal was served to the children. At GBP, teachers ate their lunches in an old classroom in the dilapidated wing of the school.

4.5.2 Coping and Resisting

It became evident that teachers in government schools had to deal with a relentless onslaught of contingencies which if they occurred year to year would result in teachers working without being able to plan their teaching work to any significant extent. These contingencies were additional to the inspection regime that teachers experienced. They seemed to experience a sense of being under a scanner and therefore were guarded in their expressions and responses. Placing the more boisterous younger children at the back, taking care to immediately replace charts that were torn down, appointing class leaders to keep up appearances of order, the need to justify poor achievement by blaming the students were all responses to being held accountable without being provided adequate reflective spaces to develop a critical understanding of their work. They also developed an outlook that combined cynicism and passive resistance. Taking casual leave to avoid training workshops or mutual adjustment to cover for each other were some of the methods adopted by teachers to resist what they perceived as the hard-to-comply-with demands made on them. Staying away from school for some weeks on the grounds that they were completing the voter verification lists

seemed to be another instance of resisting the system that paid little or no attention to their lives as individuals with needs and aspirations.

The present focus on in-service training in the background of new programmatic initiatives in elementary education like the DPEP and the SSA also provoked a sense of being at the receiving end of policies that did not make much sense on the ground. Although Shanta and Vijaya glossed over the question of trainings by saying they were 'good', Manjunath spoke about the excessive number of trainings under the SSA. He felt that the earlier system of subject inspectors visiting and giving feedback on how to conduct lessons was preferable to the present demands of accountability. He felt that it was unreasonable to expect teachers to get children ready for age appropriate academic work by means of short term remedial teaching programmes. This demand made it problematic and frustrating for the teachers. The issue of organising a "tent school" for children of migrant labourers and later enrolling them into the model school was similarly seen as problematic by some teachers. In this context, the headmistress mentioned enrolling only 15 children when in reality, there were over 50 children of the school going age in the colony. She said, *"If we write all their names down, hardly ten or 15 will turn up and the inspectors will ask us why the others are not coming."* The teachers already had the additional task of paying home visits to enrolled students who were 'long-absent' and finding out why those children were not attending school. One could understand why they did not want to further add

to their work load by enrolling children who were unlikely to attend school. During the visit to the migrant labour colony, several mothers flatly refused to send their children to school citing reasons such as *"we are afraid to send them across the road"; "who will look after the babies if these go to school".* Some of them even challenged the teachers; *"You look after the babies while I go for work, then I will send my daughter."* Several children who had been earlier enrolled ran away and hid on seeing the school children and teachers walking among their temporary households.

4.5.3 WORKING IN GOVERNMENT HIGH SCHOOLS (GAH, GBG)

The government girls' high school, GBG, had better infrastructure and adequate classroom space compared to GAH. A new wing had been added allowing high school teachers to have their own staff room whereas earlier they had to share the space with college teachers, since the government junior college also functioned in the same premises. Earlier the high school and college were separated temporally by functioning at different times, but recently the high school had got new classroom space to work with and now the school and college functioned simultaneously. Each standard in the high school had five sections with about 50 girls each. All classrooms had benches and tables.

At, GAH, the school had insufficient classroom space and the high school students, the junior college students and occasionally, the primary school students shared classroom space in a sort of relay which meant that

classrooms were contingently available and occasionally students had to work on the verandas or grounds. Two of the high school classrooms had benches and tables and when a high school section occupied these rooms, the students sat 6 to a bench jammed close to each other with a few students sitting on the floor. All the other classrooms were bare save for a rickety teachers' desk. The high school standards had two sections each with over 70 students to a section. Given this number, the teacher's remarks about the impossibility of correcting every student's home work seemed justified. The new headmistress had taken it upon herself to organise lockable steel doors and windows for all the classrooms since there were frequent break- ins and the wooden doors had all been almost completely broken down. College students had also wrecked some of the furniture and ripped out all the electrical switch boards. The college students finished early on most days and thus the college and school were separated temporally for much of the academic year. The high school teachers had their own small staff room into which they retreated as soon as their classes were over.

Like the primary school teachers, the high school teachers too had to function in an inspection regime and teachers often felt the need to justify their teaching methods and find explanations for student achievement that minimised their own agency. They too were subject to contingencies from various sources and had the further problem of dealing with adolescents. In GAH this included dealing with students' love affairs and loss of interest in

books and in the girls' school it included helping girls suffering from painful menstruation and at the same time being vigilant enough to recognise when a student was avoiding a test or extra classes on the pretext of needing to go home because her 'periods' had started.

High school teachers had a lot more record keeping doing and on each occasion that the researcher visited the schools, there seemed to be some form or the other to be filled. Forms ranged from personal information forms concerning salaries, loans, years of tenure and related items to detailed caste-wise enumeration of students. Records about number of textbooks distributed, number of cycles distributed, etc. were also called for from time to time. In addition to these, the marks registers with the student scores in the examinations that were conducted thrice a year had to be filled as also attendance registers. Sharada had the added responsibility of maintaining a memo book recording the minutes of discussions with parents of students who had poor attendance records. In GBG, the teachers had the additional load of conducting remedial classes for students from Tamil or Urdu backgrounds and analysing the students' weaknesses from the pre-test and post test scores.

Unlike primary teachers, the high school teachers had a well-defined timetable to follow and were not expected to do classroom work throughout the day.

All government teachers were subject to demands to conduct parent meetings, or attend meetings or workshops, or in the case of the GBG go for

visits to primary schools under the ‘samudaya’ programme with minimal or no prior notice. The ‘samudaya’ programme was a programme in which high school teachers had to visit primary schools in the surrounding areas to mentor the teachers there and monitor the functioning of the schools.

Both high schools had a staffroom with individual desks for the teachers. These desks were often piled high with notebooks and registers. At GAH, the staffroom was a small room with just enough room to accommodate all the staff members, whereas the staffroom at GBG was a fairly large one with school desks for individual teachers.

4.5.4 WORKING IN TUNGA PUBLIC SCHOOL (PU)

Teachers in PU worked for much smaller salaries, but under generally pleasant surroundings compared to teachers working in government schools. Most of them lived in the neighbourhood of the school and did not have to commute long distances. The assembly at the beginning of every day was very orderly, almost choreographed, with each class led to the ground by the teacher in charge. Children were trained to maintain silence as they walked to assembly and walked back to their classes.

All teachers had a well-defined timetable to follow and if any teacher was absent, substitution periods were organised by the Principal. Meetings with parents were scheduled well in advance and unlike their counterparts in government schools, they could expect working days to have a predictable rhythm and were not expected to alter their teaching plans or schedules

without prior notice. Teachers were served tea in the staff-rooms during the mid-morning 'short break'. Teachers were expected to stay on in school for about an hour after the students left to correct notebooks. Since most teachers did not have to commute, they usually stayed back and in case they had to leave school earlier, felt obliged to take the Principal's permission to do so.

Teachers had periodic inspections of their classrooms by the Principal or by an expert appointed by the trust that ran the school. They accepted these inspections as necessary and did not seem particularly concerned about these, except to caution students to maintain silence saying “Principal sir is coming, be silent and do your work”. Teachers seem to appreciate the Principal’s role in “maintaining discipline” which meant stronger control over students' movements and talk.

Parents and visitors could enter the school only through a specified gate and had to wait at the reception area before meeting with the Principal. They were not permitted access to the classrooms. If parents had to meet with a teacher or a student, they had to do so at the seating area at the reception.

Teachers did not directly interact with parents except during the specially scheduled meetings that took place after each round of examinations.

There were separate staffrooms for high school and primary school teachers. The staffrooms had a large central table with chairs arranged all around. Teachers had individual lockers to keep their textbooks and other

personal belongings. A counter along one wall of the room was usually cluttered with piles of notebooks that had to be checked by teachers.

4.5.5 WORKING IN TARA INTERNATIONAL SCHOOL (PI)

The teachers in the international school had the best deal of all the teachers in terms of salaries and work environments. They could avail of the school's transportation system to reach school if they chose to do so and most of them did make use of this facility. The school buildings were aesthetically designed and the large airy classrooms were pleasantly and comfortably furnished. Teachers had a well-defined time tables and well-resourced work stations.

Teachers were expected to be innovative in their teaching and experienced sufficient autonomy to plan their lessons using the ample library and computer resources that the school provided. The annual work plan and individual accountability schedules for submission of report cards were prominently displayed on the teachers' individual desk spaces.

There was no morning assembly and lessons started five minutes after the scheduled time for the buses to arrive at the school, which was 7:55a.m. Students were not expected to move silently while walking to their classrooms, but there were clear expectations that they were to be at their seats for class at the correct time. Unlike the private school, the teachers did not accompany students to their classrooms, nor did the students walk in line. Teachers stood at the door of the classrooms exhorting students to be seated

before the bell was sounded to signal the start of teaching time. Teachers had a cafeteria and a lounge in addition to their workstations. They also had access to computer facilities that they used to download teaching resources and create worksheets in addition to maintaining student achievement records. The school had workstations for teachers to sit and work when they were not engaged in classroom teaching.Work stations were unlike the staff rooms in the private school, being designed to accommodate three or four teachers and not designed for all staff members to sit together. There were several such teachers' work stations located in various wings of the school.

Entry to the school was regulated and parents were expected to take a prior appointment if they wished to meet a teacher or the principal. Visitors were given entry passes after the watchman had confirmed with the receptionist that the visitor was bona fide.

4.5.6 COMPARISONS OF WORK IN THE DIFFERENT SCHOOLS

The government schools had a much greater degree of direct face-to-face interactions with the communities they served. Though the schools had compound walls, these were breached at several places. One of the schools, GAH had no gate at all, and the girls' school, GBG had gates that were never closed. On weekends, children used school grounds to play and in general, after school hours, various members of the public were free to use the school premises, though the classrooms were locked.

Government school teachers often had direct interactions with parents and other members of the community whenever these people chose to visit the school and seek out a teacher. There was no system for regulating entry to the government schools and this meant several unscheduled interactions with community members in addition to the mandated interactions with parents that had to be organised. Government teachers had to go on enrolment drives and home visits, and also go into the community on tasks related to elections or state health campaigns. The net effect was that government teachers were much less insulated from the communities they served when compared with private school teachers.

Both in the government schools and the private school, PU, teachers were expected to take charge of student movements before beginning lessons and did so. Recalcitrant students were quickly disciplined, either by use of voice or occasionally, in the primary school, a quick stroke with the stick. This happened very rarely as students seemed to know what was expected at the start of the lesson and complied out of habit. Parents too expected this and expressed approval of a strict teacher who knew how to keep the students in line. However in the international school, PI, this was a slightly fuzzy area. Students were expected to be in their seats at the appointed time, but at times were defiant. At the start of one of her classes, Meena tried reasoning with students clamouring for her to call off the class before resorting to a mild threat, which in Meena's case amounted to telling students, “Those who have

the courage to do it by themselves, go, I will not take this up again, so if you can do it by yourself, go." Two other teachers, Kaveri and Sheela used sarcasm to control students at the start of the lesson.

At the close of the day, teachers left in the buses along with the students. Since class sizes were comparatively low, they did not express difficulties in checking students work and had enough time during their work day in school to manage this task.

4.6 TEACHERS AND THEIR STUDENTS

Explanations of educational failure are most often given in terms of pupils' ethnic and social class antecedents and rely on a concept of social pathology rather than one of cultural diversity. Keddie (1971) examined the processes by which educational deviants are created and their deviant identities maintained. In conclusion, Keddie wrote: "Ability is an organizing and unexamined concept for teachers whose categorization of pupils on the grounds of ability derives largely from social class judgments of pupils' social, moral and intellectual behaviour. These judgments are frequently confounded with what are held to be rational values of a general nature" (p.136).

The schools studied in Bangalore did not practice pupil tracking. However, as has already been pointed out in the chapter on schools (Chapter 3), there was a difference in the social class backgrounds of the students who attended these schools. The possibility of differing teacher beliefs regarding their pupils was therefore explored in the course of interviews and informal

interactions with teachers in the schools. In a way, it seemed as if the beliefs of the teachers across the different schools were more or less similar in terms of the way they reflected the perceived relationship between student social class backgrounds and their abilities. Teachers in the government schools had low expectations from their students, teachers in the private school perceived distinct differences in student abilities and performance and often attributed these to the home backgrounds of the students, whereas whenever teachers in the international school mentioned student abilities, it was in positive terms underlying their high expectations of the students. These notions of student ability and social class were not exclusively held by teachers alone, but were part of the general 'common sense'.

In the course of several interactions with the teachers, both formal and informal, in the schools, the explicit statements about students were recorded. These were categorised as follows:

- Statements about the students' background
- Remarks about the difficulties in teaching certain students in relation to particular subjects
- Justification and analysis of poor achievement in terms of parental neglect
- Justification of student behaviour in terms of their backgrounds
- Other justification for low achievement of certain students

Certain statements tended to be more often made in the context of government schools. In the case of the private school, there was a perceived mix of students from lower class backgrounds and students from higher class backgrounds and teachers here explicitly analysed differences in student behaviour and performance in terms of home backgrounds.

4.6.1 TEACHERS' UNDERSTANDING OF STUDENTS' BACKGROUNDS

Government schools

Teachers working in government schools were aware of their students' home backgrounds as they were responsible for monitoring students' attendance and had to do home visits whenever a student was absent for a prolonged period. Unlike the case of private schools where the parents/caregivers had the responsibility of ensuring that their ward was regular to school, government school teachers were charged with the task of ensuring student attendance. This meant that they were often in a position to know the family circumstances of students and had a sympathetic understanding of students in difficult circumstances. This understanding did not translate into special efforts to help such children in the classroom. Instead, teachers conveniently held family conditions responsible for the student's under achievement.

Pejorative terms were used on several occasions by teachers and statements were made about children's abilities and homes implying deficiencies. The following instances have been selected because they seem to typify the teachers' notions about the children in their school.

In the model primary school, Shanta (GAP) said : *"The children who come here are polis*" (meaning uncivilised or uncultured).

On the first day of the term following the Dussehra vacation, Shanta grumbled that the whole school was dirty after the vacations. The headmistress and Shanta spoke about the *'polis'*, who damaged the school and dirtied the classrooms.

Vijaya (GAP) spoke about the difficulties in managing children: *"These children need to be told even basic things like putting away the books of one subject after the period is over and taking out the textbooks for the next subject."*

While reading historical information about Karnataka published in newspaper on the occasion of the Kannada Rajyotsava day, Vijaya said several times, *"You people don't get papers at home do you?"* and the children dutifully chorused "no" each time in an automatic response. The exception was one boy, who shook his head in disagreement, but went unnoticed by Vijaya.

While explaining about the type of homes the students come from, Vijaya narrated, *"See there was a girl in 7th. Parents quarrelled and the mother took bags, books and went away. The girl, she didn't come for a month. I went to their house and asked questions. The girl's chikkappa [*uncle*] explained what had happened. I said if she had told us, that her mother had taken the books, we would have helped. Now she is coming to school."*

At the primary school in Malleswaram, Manjunath referring to the government policy of providing education for all said, "They fill the schools with all sorts of children *(yaar-yaaro)* from the slums*."* He went on to add that schools were forced to enrol difficult to educate children regardless of whether they were offspring of rag-pickers, stone workers or garbage handlers.

At the high school, Vimala spoke about lack of parental care at home and broken homes, about students having to work for survival and about students coming to school hungry since no one cared about them at home. Savita (GBG) spoke of poverty:

> *"They come from very poor economic backgrounds. The homes are very poor, each rupee is important for them. To give an example: two of the girls hadn't got graph books. If I forced them to get it, they cry. The girls said they got Rs.5 from parents, but the graph notebook costs Rs. 16."*

She also spoke about how urban poverty makes people suffer in isolation, *"In the village at least, even if they are poor, no one goes hungry, people help out and take care of each other. Here, they come from sdifferent places and no one knows or cares about the other."*

Private School (PU)

In the private unaided school, Tunga Public School, teachers spoke about students who came from different family backgrounds and distinguished

students on the basis of their home backgrounds. In the private school (PU), Shantala talked about the different types of students who came to the school and mentioned "high class and low class mentality". When probed about this, she explained that there were some parents, who despite being poor were concerned about their children's studies and made sure that their children did homework and were regular in attendance – (high class mentality). Some of the poor parents, on the other hand, were unconcerned about their children's studies and did not ensure that their children spent time on studies at home – (low class mentality). She also spoke of children from the nearby slum areas who came to the school and referred to their parents as being uneducated. Shivraj (PU) differentiated between parents who were economically well off and uneducated; and those who were economically well off and also educated.

In this school, the students in the A section of standards VII and IX were considered better achievers than those in the B section. Due to less number of students, there was only one section in standard VIII. Teachers also mentioned that most of the students in the B sections were from the nearby slum areas. Shivraj said, "Coolies send their children here! I tell them that it is better if they go to the government school. They don't do well in studies and parents end up spending a lot of money for sending them to this school."

International School (PI)

At the international school, PI, teachers did not make explicit references to student backgrounds. In just one instance, a reference to student backgrounds was made in the context of the students' capacity for academic achievement. Kaveri, explaining what she perceived to be a lack of effort from the students to aim for the highest possible scores, cited students' affluent home economic background as the main factor.

4.6.2 Difficulties in Teaching due to Student Backgrounds

Government schools

The Headmistress of a government school (GAP) spoke about the kinds of children who came to the school and said, *"I am supposed to teach them English! What English can I teach them?"* Her remark implied that it was unrealistic to expect teachers to successfully teach English to students from the lower classes. There was also an implicit and common understanding that therefore did not require stating, that English was a language suitable for the elite or higher classes of children. Manjunath (GBP) said that although he felt that the government's policy of providing education for all children till the age of 14 years was in principle laudable, it made the lives of the government teachers difficult.

> *"We are supposed to enrol any child – and even without TC – all sorts of them are taken in. We are supposed to place them in the class*

*according to their age. Some of them have never been to school and don't know even the alphabets. Then we have to do remedial teaching (*parihara bodhane*) and get them ready for the required level and make them pass! Some of them join, and after three to four months when the stone breaking work or masonry work, whatever, the building construction work is over, they will move and join someplace else. They won't even take the TC from us."*

Speaking about the students she had to teach at the girls' high school, Savita (GBG) said, "Here the children's level is very less – they are not fit for VIII standard. We have to prepare them through a bridge course and get them ready. What we teach in school, that is all [they learn]." (sic) This implied that the teacher could not count on any academic support for the student coming from the home.

The Government Girls' High School (GBG) was an English medium school. Parents who could not afford to send students to private English medium schools chose to send their girls to this school, particularly if the home language was not Kannada. Over 2/3rd of the students in this school came from homes where either Urdu or Tamil were spoken. Teachers at this school said that parents who felt that their daughters would not be able to cope in the Kannada medium government schools opted for the English medium Government High School. Teachers expressed that students from Tamil and

Urdu speaking backgrounds were unable to do as well as the Kannada-speaking students. The school was directed by the State Education Department to admit students who opted to study in English medium at the secondary level without conducting any test to see whether the students had adequate competency in the language. Mathematics teachers had to conduct a 'bridge course' for students who performed poorly in the pre-test held for them after they were admitted. Teachers mentioned that they found it frustrating when students did not manage to do well even after receiving special help during the bridge course.

Sairabano (GBG) and Savita (GBG) while discussing the bridge course spoke about the dismal post test scores of the VIII standard girls in mathematics. Sairabano explained that the pretest scores had indicated that the girls who joined from Tamil and Urdu medium schools needed practice in multiplication tables. The teachers had taken remedial classes for these students. During the remedial classes, the English terms used for various mathematical operations were also explained to the students and yet they had not scored well in the tests conducted after the remedial classes.

Another source of frustration for the teachers was the necessity of coping with students who had been enrolled following a special drive to admit students who had dropped out after elementary school (standard VII). Girija (GBG), a science teacher, spoke about girls from the slums who were admitted to the school after an enrolment drive. She said that these girls stayed together

in a gang and resisted teachers' attempts to get them to study or do homework. The experience with these girls had been very frustrating for the teachers and they spoke about the problems of trying to get dis-interested students to pass the secondary examinations (SSLC) at the end of standard X. Girija recalled that about eight years back, when she had first joined the school as a teacher, there were many more high achieving students.

Vimala (GAH) spoke about her own problems while teaching students in government schools, *"Some students can't understand what we say. We can't go down to their level, so there is a gap."* Comparing the students at the government schools where the syllabus set by the Karnataka State Educational Examination Board (KSEEB) with students who went to private schools under the Central Board of Secondary Education (CBSE), which was an all India board, Vimala said, "In CBSE, even first standard kids come to know what are elements. Here in VIII standard also (shook her head), some of them have to be taught alphabets.[2]" Vimala was not speaking from direct personal experience of children who studied in private schools affiliated to the CBSE. But her comments reflected the general perception about the difference in the learning level of children who go to different schools, in accordance to their social classes. According to Sharada (GAH), all the students she taught were, *"below average"* and she said that *"the back row girls are impossible, they*

[2] Quoted verbatim as Vimala was speaking in English. Elements here refers to chemical elements, a concept that is introduced in Std VII.

don't learn anything". This remark was made aloud in the class room within the hearing of the last row of students and while they seemed to be working problems in their notebooks like the rest of the students. Vimala also spoke in terms of "all students below average, only one or two first classes*".*

Approximately 60 percent of the high school teachers in the government schools felt that the teachers in the government primary schools were not doing their work effectively. They felt that they had to cope with students who had not learnt the basics due to poor teaching in the primary schools. They were critical of government policy that allowed students to move from standard I through to standard V without examinations.

Private School

At PU, Shantala spoke about the difficulties faced by teachers as they had to take into account the differences between children with "high class mentalities" and those with "low class mentalities". Shantala said, "We have to take into account the differences and do the planning to help all children – above average, below average – it doesn't always work out. It is difficult."

When probed about the meaning of 'high class mentalities' and 'low class mentalities', Shantala explained that she was referring to the interest shown by the parents towards academic learning. She felt that in the case of many students who came from the nearby slum area, the parents were not

concerned enough about their children's studies. Such parents did not come for parent-teacher meetings conducted by the school after each cycle of tests/examinations, did not ensure that the children did homework regularly, and did not bother sending the children for tuition. She opined that it was not a matter of being able to afford money for tuitions and that parents who valued academic learning could find ways to help their children with studies at home.

Shivraj (PU) mentioned the challenge posed to teachers due to students *"*losing interest in learning and becoming more marks-oriented". He responded when probed about what he thought were the reasons for the "marks orientation" of students, he said that it was due to social prestige associated with certain jobs and the competition to get entrance to the courses that qualified students for these jobs. With reference to students of IXB section, he said that students in this section are slower as *"they do not do their homework and say they have not understood and so I have to spend longer time in that class teaching the topics."* Students who were placed in the B section were judged to be low achievers on the basis of their previous year's examination scores. This was part of the school's policy and all the teachers knew that the B section had low achievers.

International school

When specifically probed about the difficulties they may have with respect to some students, teachers at this school mentioned challenges rather than difficulties that they faced while teaching. Kaveri and Sheela specifically

referred to the home backgrounds of the students in this school and said that students came from "good backgrounds". Kaveri mentioned that since students came from affluent backgrounds they got all the required support for their studies at home. This can be contrasted with what teachers in the government schools said about students not getting adequate parental support for studies at home. In the private school, PU, teachers seemed to feel that students either came from homes that were supportive of academic work or from homes that were not adequately supportive of academic work.

Teachers in this school were concerned about using many methods to help students understand and perform well academically. The implicit notion seemed to be that teachers had to tailor their teaching to meet student requirements. Maya and Mohan spoke about using several different teaching methods, such as mind maps, group discussions and project work and the need to spend time planning lessons together, since they were co- teaching some topics. This was also the case with Sheela and her colleague (Sheela's colleague was not a respondent for this study). Teachers spoke of the need to prepare worksheets and spoke about the information that students brought to class. They needed to monitor students with learning difficulties, but the teachers felt that the school had a good system in place to help these students. In the staff room, teachers spoke of specific issues with certain students and these were often related to attitudinal problems rather academic achievement or home backgrounds.

4.6.3 EXPLANATIONS FOR STUDENT ACHIEVEMENT/FAILURE

Teachers' explanations for student achievement or failure seemed to fall in to the following broad categories:

- Home background and parental support
- Students' innate mental abilities
- Students' attitudes and dispositions towards studies
- Role of the teacher

Very few of the teachers (12 percent) mentioned their own role in enhancing student achievement, although three teachers, Vijaya (GAP), Shantala (PU) and Sheela (PI) spoke about trying to provide specific help to students who had learning difficulties.

Home background and parental support

Approximately 60 percent of the teachers referred to the role of parents' support in helping students do well in science at school. In all the schools, except the international school (PI), lack of home support was mentioned as a reason for students' poor achievement. Vijaya (GAP) explained why she thought students did not do well in school: *"In the house, parents don't care. They don't see what the child has written in school, what was taught..."* Explaining further about the causes for students who were 'lagging behind', Vijaya spoke about 'family problems'.

Vimala (GAH) spoke about the many home-related factors that come in the way of student achievement. Parents were considered responsible for student absenteeism, "Some students miss classes – either they will be absent in the morning or not return after lunch. How many times to tell parents, it is frustrating. Many students come to school after work. They will not have read at home. They won't have time or will be tired. Some will not have any care at home, or come from broken homes. Sometimes they won't get food also before coming to school." Despite all these problems, Vimala said that many students studied and passed and some even managed to get 60 percent. Responding to a question about the reasons for some students doing well, Vimala said "some parents will give push*"* to them. By this, she meant that the parents ensured that their children were regular with their studies and homework, and sent the children for tuition classes after school.

Apart from low achievement and failure in science, Vimala also spoke about poverty itself being a factor leading to exclusion of students from science in higher education. *"From my class, two boys, who got first class, joined commerce."* When asked why this was the case, she explained, *"Their home conditions are difficult, one of them sells flowers strung by his mother. The father is not around, this is a common story. If they take science, they should take tuition in second PUC, they can't afford that."*

Like the other government school teachers, Vimala, was aware that often lack of parental support was a consequence of poverty.

When asked whether she thought the performance of students from upper class and lower class backgrounds differed markedly, Shantala (PU) said, "Generally we cannot say. I cannot say that all first class students are from higher class and that children who are dull are from the lower class – I cannot say." Articulating what appeared to be commonly held notions about students' underachievement, she said, "May be it is lack of attention from parents at home and they are not able to complete their home work at home and come." She went on to explain further that parents can make a difference to their children's studies. "If parents are helping, then definitely the student will be bright. They can understand better. Even if the parents are of lower class, they may teach in their own mother tongue. If parents explain the concept in Kannada, the student can understand better and can also express where he is not able to understand. Parents help is more important in the home. This is not found in the lower class – parents are not educated, yet. Like, the parents from Sanjeevininagar and Marutinagar, (low income colonies) they work, they have no time and they are not educated and they cannot understand, they cannot help in the home. Even they do not sign the diary and send, they cannot read the memo I send. With such children, I find problems, they are wholly dependent on the class. They will not even send for private tuitions. The higher class parents they will send the children for private tuitions, so they will be thorough with the subject. The other parents don't do

that, so they are only depending on the class – we have to look into that also." (sic)

When asked about what factors could be said to help students do well in school, Shivraj said that it depended on the interest shown by the student in the classroom. He related student interest in science to parental support. He said, "If the economic background is good but parents are uneducated, the students show less interest in class. If economic background is good and parents are educated then students show good interest in class." (sic) He reiterated what seemed to be the commonly held idea, that "poor students do not get enough help in studies at home."(sic) At PU, girls on the average performed better than the boys in the tests and examinations. Interestingly, Shivraj explained this as being due to girls in the school coming from more economically well-off homes. He gave the following reason for the higher scores achieved by girls on an average, *"Girls do better because girls from more educated homes are sent to Tunga while the boys from these homes get to go to better schools. The boys who come here have less educated parents."* Similar observations about poorer parents opting to send their boys to better reputed schools, but girls to Tunga Public were shared by other teachers.

At the international school, teachers did not generally refer to the parental background of students in the context of their ability to do well in the class. However, Kaveri was an exception. While talking to this researcher about why students in her class did not get the highest possible marks –

"*nineties",* but settled for less, Kaveri mentioned "Affluence!" She explained that since the parents of children in this school were very affluent, they did not worry too much about their children's performance as they could afford to pay for whatever course in higher studies that the children decided to pursue.

Students' innate mental abilities

While talking to the researcher about student's achievement in science, about 70 percent of the teachers referred to students' innate mental abilities in one way or the other. Vijay of GAH spoke about poorly performing students' "*mental problems".*

Vimala (GAH) offered an informal numerical analysis of student performance and said that about 30 percent of the students would attempt all the questions in the test, about 20 percent would attempt all the questions but not get all the answers correct and another 30 percent of the students would attempt the fill-in-the-blanks, but not the questions requiring longer answers. The bottom 20 percent of students would hardly have written anything. She mentioned students' "mental capacity*"* as one of the factors that determined performance in school. The others being parental push and attitudes towards studies.

Sharada (GAH), the senior teacher who had missed a lot of teaching periods due to her additional responsibilities as a subject inspector, said that the reasons for so many failures in mathematics (a subject she taught) was due

to the students being "below average*".* Sharada said, *"Among my students about 10 percent do well, 20 percent can pick up and another 20 percent can be helped to improve. Remaining 50 percent don't do anything – they are the reason for our poor results."* Sharada thus seemed to perceive a higher rate of failures than Vimala in her class.

Shantala (PU) also referred to some students' mental abilities while explaining their poor performance in tests. "May be some problem in the mind," was how she put it. When asked to explain she said that some students did not seem to have enough "memory power". In her standard VII class, Shantala had identified a boy in the front row and two girls from the last row as poor performers. When asked on what basis she had identified these children, she said, *"They do badly in the written tests."* She said that they did not have enough "memory power" and did not learn at home. Shivraj who taught at PU, mentioned that "heredity" also had a role to play in determining a student's performance.

Kaveri (PI) who taught biology to the IX standard was asked about her students' performance. She said, "They do well. Native intelligence is there*."* In this case also, the reference was to the role of innate mental abilities of students. The interesting aspect of this statement was the underlying assertion by Kaveri, that all the students in her class had the requisite *'native intelligence'.* Sheela (PI) who taught science in VI and VII standard and physics to VIII standard spoke in positive terms about the abilities of students

of the VIII standard. She said, “This is a very good group. They work on their own. If we structure (the project-based lesson) too much, they don't like it. They like to be allowed to do work on their own.”

Students’ attitudes and dispositions towards studies

Almost 50 percent of the teachers in the different schools specifically referred to students’ attitudes or dispositions towards studies. Vimala (GAH), while talking about high school students, mentioned students' dispositions as well parents' role in poor achievement, “reason is laziness of students and no care from parents”. In this case, it is not ability but laziness. As Vimala elaborated, “Even if some students can do, they will not do. They are lazy.” A further reason for poor school achievement was articulated by Vimala. This was to do with the present day adolescents’ involvement in *“*affairs*”*. She spoke about how students who had been doing well in the VIII standard would suddenly show a decline because they fell in love. She gave an example of a boy who had joined the high school having achieved a high percentage in his VII standard examination. This boy did quite well in the VIII standard also, but didn't do quite so well in the IX standard. He seemed to be picking up in the X standard, when a girl sent him a love letter. According to Vimala, this resulted in the boy failing his X standard and having to take the re-examination two months later in June. Vimala mentioned that the girl, on the other hand, failed the examination both times, in March and again in June. Vimala was implying

that forming strong interpersonal relationships at high school caused some promising students to lose interest in studies.

Shivraj (PU) spoke about student interest in class, implying that student interest in class was related to test performance.

Kaveri (PI) referred to the attitude of students which prevented them from achieving very high scores in examinations, "They don't try hard, they will get sixty to seventy (percentage in examinations), even eighty they get. But they are satisfied, they don't try for ninety. No inquiry, they won't ask – they mug up and come." (sic)

Role of the teacher

Very few teachers (12 percent) mentioned their own role in helping students do well in the classroom. Teachers who did mention this did it in the context of helping weaker students to do better.

On being asked how such children could be helped to improve, Vijaya (GAP) said, *"We have to teach according to ability"*. When asked how this could be done, she said, *"There are special classes. We find out why some children are lagging behind and help them."* These remarks ought to be seen in the context of state-level policies on inclusive education, according to which children with special learning needs had to be included in the class room and teachers were given three-day workshops on inclusive education.

Gayatri (GAH) who a taught the same subjects (physics and mathematics) at the same high school as Sharada, but to a different section expressed that she was satisfied with the way her X standard students had performed in the SSLC examination. There was no streaming on the basis of ability and she implied that the differing results obtained by the two teachers may have been due to their differences in their teaching. There were some differences in the teaching styles of the two teachers. One difference was that Gayatri tended to direct more questions towards girls and also check their notebooks before looking at the work of the boys. Another difference was that Gayatri spoke in softer tones, while Sharada had a harsher demeanour. Gayatri, unlike the other two science teachers in the school did not comment about the students' lack of home support or their lack of ability. Vimala and Sharada made explicit comments about students' abilities or homes in the presence of students. In her conversations with the researcher, Gayatri said, "Why is my section doing better?" By this she implied that her way of teaching helped students achieve better in mathematics, but refrained from explicitly comparing her teaching with Sharada's.

When asked how the children who were not doing well in the class tests could be helped to do better, Shantala (PU) said, "We should make them read the same thing more times." Referring to students who did poorly because they did not receive the requisite parental support at home, she said that the teacher had a bigger role to play in helping these students cope with

studies. “Remedial classes and tuition and all should be done for these children. We don't want any children to fail. We have to start remedial classes from the V standard. We have to have coaching after school to make these children pass.”(sic)

She also made a reference to the teacher’s role in making some students lose interest in science. She said, “May be it is the teachers. Maybe, some teachers - there is a bad impression and they are hating the subject very badly and they are not able to learn. This also affects the children.” (sic)

Sheela (PI) referred to her role in ensuring that children in her class who had been diagnosed with learning difficulties were supported in their learning. One of the methods she used to support these students during group work was to ensure that they were distributed in such a way that each project group was a mixed ability group. She also monitored these students more closely to make sure they were doing the classroom tasks expected of them.

4.7 Differences In Perception About Students

There is a well-established body of literature that affirms the influence of various aspects of teacher thinking about teaching and learning, on classroom practice and learning outcome (Brickhouse 1990; Briscoe 1991; Brophy & Good 1970; Cochran-Smith, 2000). Pajares (1992) placed beliefs within a constellation of related constructs that includes attitudes, expectations, values, opinions, perceptions, conceptions, and dispositions, among others, all of

which exert powerful influences on behaviour. Bryan and Atwater (2002) also proposed that “beliefs are part of a group of constructs that describe the structure and content of a person’s thinking that are presumed to drive his/her actions” (p. 823).

The relationship between belief and teacher praxis is critical to an understanding of educational outcomes. The work of Rosenthal and Jacobson (1968) was one of the earliest to focus on the effects of teacher expectations on student outcomes. Later research in urban schools supported the earlier work and showed a strong relationship between high teacher expectation and student success (Entwisle &Alexander, 1998; Ladson-Billings, 1994). Considerable research now exists on teacher thinking which shows that teachers' beliefs about teaching and learning affect many aspects of classroom practice, including lesson planning and assessment of student learning (Pajares 1992; Richardson, 1996; Taylor & Macpherson, 1992).

Some themes that have emerged from the preceding three sections on teacher's views on students, teaching difficulties and achievement are presented in the following section:

One striking aspect that was noticed when comparing teachers' perception about students across schools was that many, though not all teachers in government schools held negative beliefs about their students' and most had low expectations from them. Teachers in the private school had differing expectations from students coming from different social classes

whereas teachers in the international school seemed to have high expectations from their students and also confidence in their abilities.

As , Gayatri (GAH), a government high school teacher said, *"If even one student takes up science after SSLC ..."* and shook her head, implying that it is very rare for students in her school to take up higher education in science. Gayatri articulated the widely-held perception that students found mathematics and science difficult and scored low in these subjects. As Gayatri put it, *"The average pass percentage comes down because of these subjects."* Teachers felt that students did manage to score much higher in Kannada or Social Studies. This perception seemed to follow the secondary exam results as the lowest pass percentage across subjects in the state secondary examinations in each year has been in mathematics followed by science. In the private school, the pass percentage was considerably higher than that of the government school, mirroring the generally observed pattern, and the school took pride in declaring its pass percentage. In the private school that year, more students had failed in science than in mathematics, three as opposed to two. In the international school, teachers expressed their belief that the students were easily able to achieve higher scores in the examinations and in general, teachers in this school did not express concern about student' examination performances. Instead, teachers in this school were concerned with providing a stimulating learning experience for the students and

structuring lessons in ways that allowed students to create projects, ask questions and research information about what was taught.

In the government schools, the teachers felt impelled to read aloud the textbook in class and dictate answers to sets of questions which they expected the students to memorise. This practice was justified by teachers saying that students did not study at home and did not receive parental support.

For the teachers in the international school, the implications of their high expectation of students meant reviewing a variety of literature and lesson plans related to the topics to be taught in the classrooms, locating different resources for teaching and even drawing on parental expertise to support classroom learning. For teachers in the government school and to a large extent in the private school, the practice of teaching that stemmed from their view of students consisted mainly of presenting and re-presenting the textbook content and drilling the students repeatedly in order for them to be able to correctly reproduce the knowledge in the correct form required for the examinations.

4.8 Deficit Model of Backgrounds of Children in Government Schools

Recent research by Prime & Miranda (2006) looked at teacher beliefs and perceptions in public schools in the US. It appeared that the public school

teachers in this research, like their counterparts across the globe, “employed what has been described as a deficit model for understanding the problems that urban children face with respect to school achievement” (p.527). Teachers' explicitly stated beliefs about their students, show that they viewed the students as deficient in many of the skills, attitudes, and prior knowledge required to do well in science. These teachers felt that the students in government schools in the city could not be expected to achieve high in science. The deficit model used to explain the low levels of school achievement of the underprivileged children in the government schools and also in the private school absolved the school or the society of any complicity in the students' underachievement and placed the blame on the students, their parents, and their communities. In this view, the students were seen as not having the needed personal and family resources required to succeed. The views held by the teachers about students reflected widely-held stereotypes that that children from the lower social class/caste groups lack the capacity or 'merit' to perform well in school subjects, especially mathematics and science.

Steele (1999) described the idea of “stereotype threat,” that suggested that members of the stereotyped groups experience levels of anxiety that serve to depress their performance when they are placed in situations where the stereotype operates. The resulting underachievement serves to confirm the stereotype, creating a self-perpetuating cycle. Fifteen out of the 18 teachers who taught in the government and private schools had also been educated in

government schools and it is ironical that they should unwittingly be the perpetuators of the same stereotype. None of the teachers in the international school had been educated in government schools and in fact all had been educated at elite private schools.

4.9 TEACHERS' VIEWS ON GENDER AND LANGUAGE DIFFERENCES

In the course of the research, teachers were not specifically interviewed about their views on gender or home-language differences between students. However, during informal interactions, perceived student differences on the basis of gender or home-language were articulated by teachers, especially in the government schools. Such differences were not explicitly mentioned during informal interactions either in the private school or in the international school.

4.9.1 GENDER DIFFERENCE

Girls are more studious

As already mentioned in the introductory chapter, girls on average had achieved better scores than boys in the SSLC examinations conducted in the years 2004, 2005 and 2006. (Records of earlier examinations were not examined by this researcher). In the tests conducted at GAH also, girls were scoring better than the boys. This was occasionally a topic for discussion between the teachers at GAH, the government high school, where both boys and girls were enrolled. The teachers spoke of girls doing better in their

studies. During a staffroom conversation, at the GAH about this issue, the social studies teacher reasoned that boys did poorly because *"It is difficult to make boys sit and study. Girls, they will sit and study, do their homework."* Vimala and Gayatri the science teachers also spoke about girls being more prepared for tests and about many of the boys being quite unaware of the tests and therefore not preparing for the tests. Gayatri mentioned how girls were regular with homework and boys would not do their homework. Gayatri said further that, *"If girls don't do homework and I scold them they will do and come next day, but boys if I scold or threaten they will stay away from school."* In another instance, when asked about student preparedness for a class test, Vimala (GAH) spoke about girls being much more likely to have prepared for the test. She said, *"If I tell there will be a test and don't give it, the girls will start crying. The boys, some of them won't even know there is going to be a test. Children of all sorts come here."*

The teachers here, seemed to share a general feeling that girls tend to spend more time with their books, were more likely to study for tests and were also more likely to comply with the teachers' demands to complete homework.

Ability differences between boys and girls

There was no common strand of belief about the differential abilities of boys and girls with regard to mathematics or science. Some teachers like Gayatri seemed to operate out of a belief that girls were better at mathematics. She

adopted a classroom strategy consistent with her belief that girls were more likely to achieve in mathematics by spending more time looking into their notebooks and correcting their work. However, in her own estimation she paid more attention to boys and rationalised the difference in achievement by saying, *"Some attention here, some attention there - I spend twenty minutes with boys and ten minutes with girls, still girls do better."* This assertion of Gayatri implied that girls were more able at mathematics than boys.

Vimala, on the other hand, responded to the general feeling in the staff room that boys preferred to spend less time with their books at home compared to girls, by saying *" Girls studying two hours is equal to boys studying half an hour – boys' have more grasping power."* The implication here was that boys had better abilities than girls. While other teachers seemed to explain differential achievement in terms of differences in the time spent studying, Vimala seemed to have a theory of differential ability, in which she considered boys to be superior to girls in mental ability.

4.9.2 HOME LANGUAGE DIFFERENCES

In the Government Girls High School (GBG), teachers were concerned about the performances of girls who joined the English medium sections and came from homes where either Tamil or Urdu was spoken. Most of the teachers with whom interviews and interactions were carried out in the school, spoke of the problems they had with Tamil and Urdu medium girls. Sairabano explained

that it was the government policy to allow parents to choose the medium and poor parents preferred to send their daughters to the government English medium high school. Several teachers mentioned that it took about a year for girls from Tamil or Urdu speaking backgrounds to start understanding what was explained in class. The girls entered high school in the VIII standard and completed their SSLC at the end of the X standard. Several teachers mentioned that *"only Kannada medium students do well"*. Shivanna, Savita and Sairabano (all from GBG) spoke about the girls joining in the VIII standard with very poor basic skills in mathematics and English. While Shivanna and Charumati, both of whom taught biology, said the girls managed to start "picking up after one year*",* Sairabano felt that the Urdu and Tamil girls do not perform well. She also spoke about these children using the deficit model described elsewhere in this chapter. The surprising observation was that teachers seemed to loosely subscribe to the idea that Kannada medium students performed well due to their having the required skills, attitudes and parental support. The teachers did not seem to be aware that giving explanations in either Kannada or English in the classroom might be hard to comprehend for students whose home language was not Kannada. All teachers repeated explanations in English followed by Kannada and instructions were invariably spoken in Kannada. Casual conversations with students also took place in Kannada. It was highly likely that girls from non-Kannada speaking homes would not necessarily be able to comprehend Kannada as well as the

native speakers. However, the reason teachers gave for Tamil and Urdu medium girls' poor achievement was that they had not adequately mastered English and needed time to do so. Charumati said, *"I have to explain in English and also say in Kannada"* then went on to demonstrate to this researcher by means of a quick show of hands that approximately a fifth of the students had studied in English medium schools, a fourth in Tamil medium schools and the rest were from Urdu medium. She further said, "*Some of them will sleep when I explain in English."* Her underlying assumption seems to have been that they would be able to follow Kannada. In this context it may be pertinent to recall that, during a parent-teacher interaction, some of the parents had requested Sairabano to explain in Urdu as their daughters found it hard to understand Kannada. Another teacher had reported that during a meeting to discuss the students' report cards, a parent had been angry with her for not being able to explain in Tamil. During a parents' meeting, it was observed that the class teacher, Girija, spoke exclusively in Kannada and there were some Tamil and Urdu speaking parents who had difficulties understanding or responding to her. It could be seen that not having Kannada as their home language was a contributing factor in students' low achievement in GBG. The situation was especially ironical, if one considered that parents chose to send their daughters to an English medium school in order to overcome difficulties with Kannada that the children would have experienced in a Kannada medium high school.

4.8 DISCUSSION

Lipsky (1980) has theorised about the nature of work of people employed in the lower levels of public organisations and referred to them as street-level bureaucrats. These include frontline workers who work directly with clients in human service agencies, such as schools, hospitals, and welfare offices. These workers are confronted by highly complex and technically uncertain tasks. The uncertain nature of these tasks, that is the unclear relationship between means and ends, both entails and requires that frontline workers employ high degrees of discretion in their work. Lipsky referred to them as street-level bureaucrats because they determine organisational policy through the routines and categories they develop to reduce the endemic uncertainties of their tasks. Teachers in public schools could be said to be street-level bureaucrats in this sense (Anagnostopoulos, 2003). The work of street-level bureaucrats, as they struggle to meet organisational goals and address the needs of their clients, is hampered with chronic resource inadequacies, and ambiguous goals. Their difficulties are compounded by the non-voluntary nature of their clients.

Lipsky (1980) identified several strategies that street-level bureaucrats use to cope with these difficulties. One strategy is to develop routines and simplifications that limit demands and restrict organisational objectives to reduce the gap between available resources and actual performance. Another is controlling the time and content of interactions with clients in ways that redefine the work and assert personal goals over and above agency goals.

Other strategies include the reclassification of clients and rationing of resources to those clients considered "deserving" and away from those clients considered "undeserving." Finally, Lipsky noted that when poor performance is exposed, street-level bureaucrats will defend their routine practices by constructing cognitive shields, or explanations of client difficulties that locate the causes of the difficulties within the client, the client's environment, or both.

Teachers in government schools, like other street-level bureaucrats, must depend on students to co produce results (Cohen, 1989). Chronic resource inadequacies, high levels of task uncertainty, and ambiguous goals mean that this dependence produces considerable tensions for teachers. Lortie (1975) found that questions about assessing student performance and their own effectiveness prompted a "kind of emotional flooding" that surfaced broad anxieties and feelings of "self-blame, inadequacy, anger at the students, despair, and other dark emotions" (p. 144) among the teachers he surveyed. Given these tensions, student failure threatens to undermine teachers' sense of self-efficacy and job satisfaction. This is particularly true for urban teachers who teach in schools where large numbers of students fail.

Present policy in Karnataka holds teachers accountable for student achievement and teachers in government schools were liable to lose salary increments if more than 60 percent of students in their classes failed. As detailed in the preceding section, teachers cope with their work pressures by

applying various strategies of the street-level bureaucrat. Giving notes and helping children rote learn answers to questions can be seen as a simplification routine with the aim of securing the required levels of achievement percentages. Government school teachers were supposed to teach an extra hour after school to help students pass the state-wide tests. Teachers routinely prepared lists of questions and answers and drilled students in these repeatedly. By requiring students to write out answers to a fixed set of questions which they had been asked to memorise, teachers reduced the necessity of actually teaching the extra hour. This was one way by which they reduced their contact time with the students. Some teachers also resorted to the reclassification and rationing strategy as in the case of Gayatri, who focused more attention on the girls, who in any case were more likely to perform better in the examinations. One could also see the various explanations for student ability and failure as cognitive shields that locate the causes of the difficulties within the client, the client's environment, or both. In a one particular instance, a teacher even resorted to re-writing a student's answer on the sly to award the student a passing grade.

The teachers in the private and the international school were accountable for student achievement, but the enrolled students were voluntary. The working conditions were far better and in different ways, these two schools provided less stressful situations for the teachers. There was no mention of increments being cut on the basis of student achievement. Teachers

in both these schools experienced greater degrees of autonomy. Despite this, there was a general tendency of teachers in all the schools to ascribe success or failure to student characteristics rather than to their own agency. Teachers operate within a classroom of several students and at least on the surface, the teaching methodology or strategy used by the teacher may be considered to be equally applicable to all the students in the classroom. It seems commonsensical to ascribe differences in achievement to student characteristics. In the case of the government schools, where teachers did not have a role in student selection, placement in grades or pacing of lessons, holding them accountable for student achievement could have seriously undermined their sense of efficacy or self-worth.

This chapter has drawn attention to science teachers as the agents in the pedagogic recontexutalising field. The biographies and self-defined roles and beliefs within the institutional setting of the school of the science teachers who participated in the study have been presented. The working lives of science teachers in the different types of schools were discussed with a view to understand how their pedagogy is constituted in the context of the schools where they worked. Whereas, Chapter 2 had placed the work of teachers within the framework of Bernstein's theories, has stepped out of this frame and offers a description of teacher's work as seen through their own eyes. The similarities and differences among teachers' reasons for taking up the

profession and the differences in their work environments have been discussed in the chapter. Finally, the chapter presented a comparative analysis of teachers' notions about students and their backgrounds in connection with student achievement in science.

All the 24 teacher respondents in this study had pre-service teacher training qualifications appropriate to the level at which they were teaching. Teachers in government primary schools had a TCH qualification and the teachers who taught in high schools had a B. Ed qualification.

Men and women teachers across the different schools expressed that they derived a sense of enjoyment by working with children. Only one teacher articulated the notion of teaching as a special mission that was important to nation building. Women teachers in all the schools mentioned that teaching as a career was suitable for women as it allowed them to balance work and family responsibilities. Four of the five men teachers in this study had come into the profession after having worked in other fields. Three out of the nineteen women in the study had moved into teaching from other jobs. About 20 percent of the teachers spoke about the opportunities for increasing their own knowledge and understanding of the subject as positive aspects of teaching.

All the teachers in government schools intended to continue in their current job till retirement and this was due to the salary and other benefits that

they got as government employees. In contrast, the teachers in PU expressed their dissatisfaction with the low salaries that they got and were seeking other options. Sivaraj took the selection test for government secondary teachers and moved out of PU during the course of this study. Arati, also from PU discontinued teaching, preferring to stay at home. Teachers at PI drew salaries that were higher than those of government school teachers and expressed satisfaction in this regard. However these teachers expressed that they would not hesitate to relocate if their husbands' were posted out of Bangalore.

One significant observation was that teachers in general tended to circulate within a particular school type. Science teachers in the government schools, GA and GB had studied in government schools themselves. The biographies of teachers also clearly showed that teachers in government schools had come from homes with modest incomes. 80 percent of the science teachers in PU which was affiliated to, KSEEB, the local state board, also had studied in government schools. Thus the teachers who taught in the schools affiliated to the Karnataka state board, whether government or private had themselves studied in schools similarly affiliated. On the other hand all the teachers who taught at PI, had studied in private schools affiliated to the national board, CISCE, to which PI was also affiliated. The biographies of these teachers also indicated that they had come from fairly affluent backgrounds and had grown up in urban areas.

Teachers in the government schools resorted to hitting children with bare hands or sticks in order to discipline them and reciprocally children had come to accept this as part of the process of schooling. A raised hand in a government classroom elicited an instinctive bodily response from the children. Hitting of children was not observed in PU or PI.

The teachers' working conditions differed greatly in the different schools. As discussed in Chapter 4, teachers in government schools had to often deal directly with various contingencies. They were also tasked with several non-teaching duties and administrative work like maintaining lists of students from different caste backgrounds and ensuring that various government schemes and programs for students from particular castes were carried out. They were called upon to attend meetings or training workshops at the cluster and block level with very little notice. Government school teachers were also responsible for ensuring students' attendance in school, unlike private school teachers where the onus of ensuring students' attendance was on the parents/caregivers. The government also drew upon government school teachers to do the work related to elections and census. Teachers in government schools had developed mechanisms for coping and resisting tasks that were thrust upon them by applying for casual leave, by spending longer than the stipulated time in tasks such as voters' enumeration. They also "managed" personal emergencies by tacitly arranging for colleagues to "cover" for their absence. As a result of all this the actual face to face teaching

time was curtailed and the students of government schools were at a disadvantage in this respect. Quantitative studies in the Indian context indicated that one of the institutional factors that related with student achievement was the time spent on instruction (Kingdon1996).

The third and fourth chapters drew attention to ways in the different schools structured the work of teachers through physical and administrative arrangements. In the government schools classrooms and teachers were not insulated from direct interaction with parents and other members of the public. This was not the case with the private schools, where classrooms were insulated to a large extent in order to minimize the disturbance of lessons. The consequence of these different arrangements was that students who paid for their schooling received more undisturbed teaching from their teachers as compared to students who were provided free education.

Teachers across schools mentioned the students' home backgrounds as being an important factor in helping students do well at school. Teachers in the private school referred to the inability or unwillingness of a section of parents to offer their children tutoring help as one of the factors that made teaching these children difficult. These students were likely to score poorly in tests according to the teachers.

The government school teachers were well aware of the lack of academic home support for their students and made several references to it

while accounting for student underachievement. By contrast, at PI there was a taken-for-granted attitude about the support students would receive from their homes and students home backgrounds did not figure in conversations about student achievement. What was mentioned was how parents further supported the classroom teaching by being able to offer their own personal expertise in the fields related to the topics being taught in school.

At GBG, where girls from Urdu/Tamil speaking families were enrolled in the English medium sections, teachers found it difficult to teach because of the low learning levels of the students. They expressed their frustration about this and also pinned the blame on the poor teaching at primary schools. In general teachers at GBG opined that girls from Urdu/Tamil speaking backgrounds were unable to achieve as well as the girls who came from homes were Kannada was spoken. At PU, teachers referred to the "class mentalities" of parents while referring to students backgrounds. They spoke of parents who made the effort to send their children for extra tuition as being more aligned towards academic goals.

Thus in general, it was observed that teachers' explanations for student failure revolved around students' home backgrounds, lack of parental support, students' mental abilities and students' aptitudes and disposition towards studies. Only 12 percent of the teachers explicitly referred to their own role in supporting student achievement. There was no common strand of belief about

ability differences between boys and girls amongst teachers in the different schools, but some teachers at GAH felt that girls were more studious than boys and therefore were able to do better in the tests.

5 PEDAGOGIC DISCOURSE

The production of new knowledge takes place mainly in institutions of higher education and private research organisations – the latter often off-shoots of the former (Bernstein, 2000; Castells, 2000). In contrast, the recontextualisation of knowledge is largely undertaken in state departments of education and training, curriculum authorities, specialist education journals, and teacher education institutions. Reproduction (i.e. the pedagogic inculcation of knowledge) usually takes place in primary, secondary and tertiary schooling institutions (Singh, 2002). Between the primary and secondary fields of knowledge – production and reproduction – is the field of recontextualisation. This field is comprised of two sub-fields; namely, the official recontextualising field (ORF) and the pedagogic recontextualising field (PRF). The ORF includes the 'specialised departments and sub-agencies of the State and local educational authorities together with their research and system of inspectors' (Bernstein, 1990, p. 192). The PRF is comprised of university departments of education, together with their research; and 'specialised media of education weeklies, journals, and publishing houses together with their readers and advisers' (ibid., p. 192).

The previous chapter (Chapter 4) presented brief biographies of the teachers and in the process, drew attention to the differences in the backgrounds of teachers teaching in different types of schools. Teachers who

taught in the government schools had also studied in government schools and graduated from government colleges. This was also the case with 80 percent of the science teachers who taught in the private unaided (PU) school affiliated to the Karnataka Secondary Education Examination Board (KSEEB). In the case of the international school (PI), all the teachers had studied in private schools affiliated to the Council for the Indian School Certificate Examinations (CISCE) and had graduated from private colleges. The teachers' reasons for taking up the profession and their work environment in the different schools were also discussed in the chapter. Broadly speaking, the reasons for career choice were similar in the case of women teachers across schools. However, for their career choice, men teachers in all the schools cited reasons that were different from those of women. The work environment in the different schools differed considerably, with teachers in the international school experiencing the most favourable work conditions. Finally, the chapter analysed teachers' notions about students and their backgrounds in connection with student achievement in science and showed how these were comparable across schools, with teachers in all schools holding strong beliefs about the effect of student's home background on student achievement. Teachers, their work practices and beliefs about pupils can be said to be agents within the Pedagogic Recontextualising Field (PRF), as formulated by Basil Bernstein (1990, 1996, 2000). Agents within the PRF struggle to control the set of rules

or procedures for constructing pedagogic texts and practices, in other words, the pedagogic discourse.

The present chapter will examine the way in which teachers in the different schools carry out their teaching. By presenting the similarities in some aspects of teachers' work across the schools, this chapter will make an argument for the relative autonomy of the PRF as posited by Bernstein (2003). The differences in teaching across the schools that were also evident can be said to be a result of triangular interactions between the ORF, the PRF and the distributive rules of the pedagogic device (Bernstein, 2000).

An attempt has been made to offer a descriptive portrait of classroom practices in the four different schools that were the sites of ethnographic observation. The description of science teaching has been placed in the context of the general teaching practices that constitute the regulative discourse of the classroom. Attention is drawn to the discursive organisation of school and classroom practices in the context of the different types of schools that formed the field of study.

Basil Bernstein's formulations about the pedagogic discourse can help us to understand the question of the relative autonomy of the school and of the 'class belongingness' of its cultural dynamics (Apple, 2002). Similarities as well as differences seen in the different schools that were part of this research can help us to understand the different ways in which students, teachers and curriculum are positioned within different types of schools**.**

Contrary to the view of the classroom being constituted of two types of curricula, i.e. a hidden and an overt curriculum (Cornbleth 1984, Apple & King 1983, Giroux & Penna 1983), Bernstein (1990, 1996) theorised classroom practice as constituted by one discourse, namely pedagogic discourse. This discourse is socially constructed by recontextualising agents such as teachers who select and embed two discourses, instructional discourse (ID) and regulative discourse (RD), to produce a single discourse, the pedagogic discourse represented as ID/RD. Bernstein (2000, p. 31) defined the pedagogic discourse as a rule which embeds two discourses; a discourse of skills of various kinds and their relations to each other, and a discourse of social order.

> "We shall call the discourse which creates specialised skills and their relationship to each other instructional discourse, and the moral discourse which creates order, relations and identity regulative discourse. We can write it as follows:
>
> INSTRUCTIONAL DISCOURSE ID
>
> REGULATIVE DISCOURSE RD
>
> This is to show that the instructional discourse is embedded in the regulative discourse, and that the regulative discourse is the dominant discourse. Pedagogic discourse is the rule which leads to the

> embedding of one discourse in another to create one text, to create *one* discourse" (Bernstein, 2000, p.32).

The pedagogic discourse is actually a principle for de-locating a discourse, say physics, and relocating it for circulation and reordering. According to Bernstein, as the discourse moves, it is ideologically transformed, and is no longer the same discourse. "As pedagogic discourse appropriates various discourses, unmediated discourses are transformed into mediated, virtual or imaginary discourses. From this point of view, pedagogic discourse selectively creates *imaginary subjects*" (Bernstein, 2000: p. 32). The pedagogic discourse is constructed by a recontextualising principle which selectively appropriates, relocates, refocuses and relates other discourses to constitute its own order. Recontextualising fields with agents and functions are created by the recontextualising principle.

> "Formally we move from a recontextualising principle to a recontextualising field with agents with practicing ideologies. The recontextualising field has a crucial function in creating the fundamental autonomy of education. We can distinguish between an *official recontextualising field* (ORF) created and dominated by the state and its selected agents and ministries, and a *pedagogic recontextualising field* (PRF). The latter consists of pedagogues in

> schools and colleges, and departments of education, specialised journals, and private research foundations. If the PRF can have an effect on pedagogic discourse independently of the ORF, then there is both some autonomy *and* struggle over pedagogic discourse and its practices. But if there is only the ORF, then there is no autonomy" (Bernstein, 2000, p. 33).

According to Bernstein's model of pedagogic discourse, the official pedagogic discourse (OPD) is an expression of the dominant principles of society, which are generated at the level of the State Field and later on recontextualised in the Official Recontextualising Field. The official pedagogic discourse is again recontextualised in the Pedagogic Recontextualising Field (Morais et al 1999). This formulation contains the levels of generation and recontextualising of the discourse.

The syllabuses followed in the schools represented official pedagogic discourse, expressed through the textbooks produced by the Karnataka Department of State Education Research and Training (DSERT) in the case of all but the international school. The DSERT as an academic organisation encompasses several academic units – Teacher Education, Evaluation, Science, Technology, Policy Planning and Textbooks (which became a separate bureau in 2006). The department also has the responsibility of administering teacher-training institutions both at the elementary and

secondary level. Thus, these institutions express the OPD which, in a given socio-political context, is legitimised in the area of education.

The dominant principles are generated as a result of the relations and influences between the State Field and the fields of production (physical resources) and of symbolic control (discursive resources), and are also, to a lower or higher degree, subjected to national influences. National-level agencies like the National Council for Educational Research and Training (NCERT) exert their influence on the state's OPD by putting out curricular frameworks that the states are expected to follow. By way of making policies that regulate schools, the state functions, at this level (generation level), as a legitimiser of the distribution of social power and control, and these principles are incorporated in the OPD.

Schools recognised by the Karnataka state's Department of Public Instruction were required to use the official textbooks which thus became the key elements in the articulation of the relationship between the official recontextualisation field (DSERT) and the pedagogic recontextualising field of the school and classroom.

The state of Karnataka allowed certain schools to follow curricula developed by national and/or international agencies by granting them 'No Objection Certificates' (NOC). The NOC allowed these schools to by-pass the regulatory mechanisms of the state in terms of the curriculum to be followed. In the case of the international school, the official recontextualisation field was

therefore not constituted by the state of Karnataka. Teachers from this school were expected to teach one of two syllabi, namely the secondary examination syllabus prescribed by the Council for the Indian School Certificate Examinations (CISCE) or by the Cambridge International Examination board, for standards IX and X. However, the school followed a common curriculum for the lower standards. The official recontextualising field, in this case, was primarily the Britain-based Cambridge International Examinations. University of Cambridge International Examinations (CIE) is the world's largest provider of international qualifications for 14–19 year olds. The CIE is a part of the University of Cambridge and a not-for-profit organisation. Textbooks and study materials used in the classrooms of the international school were produced by foreign publishing houses, such as the Cambridge University Press, Longman, Macmillan and others. In addition to these constituents of the official recontextualisation field, the pedagogic recontextualisation field at the international school was in part constituted by the training support provided to teachers by the CIE and also the online teaching material that could be accessed by teachers from these schools.

5.1. PREPARATION FOR LESSONS

During teacher preparation programmes, student-teachers are expected to carefully plan and prepare for teaching lessons in the classroom. Several in-service training programmes have also been conducted over the last decade to help teachers to teach through activities and also to help them prepare

appropriate teaching aids to support classroom teaching. Thus, one would be justified in expecting practicing teachers to spend time planning and preparing for teaching lessons. However, with the exception of the international school, teachers seemed to spend little time preparing to teach. During the course of field work, only a single instance of a teaching aid prepared by a teacher was observed across all the schools. This was a chart showing a bell-jar with an alarm clock inside, and was used by Shanta (GAP) to explain that sound waves require a material medium for transmission.

Government primary schools: GAP, GBP

Primary schools teachers did not have any clearly allocated non-teaching time and the tacit assumption was that they should engage classes throughout the working day. During the lunch break, teachers took turns to serve the mid-day meals. On some days, when one or more teachers were on leave, the remaining teachers were expected to take charge of the classes of the absentee teachers and they managed this by clubbing two sections, or at times, even two classes together.

At the government model primary school, GAP, teachers did not have time for lesson preparation during the working day. When asked what she did during her free periods, Shanta, the science teacher for standard VII was puzzled. She then explained that there were no free periods allocated to the teachers as per the timetable. Teachers usually gathered for about fifteen to

twenty minutes in the headmistress' office after the lunch bell as a break from student contact. During this time, students were expected to be in the classrooms and class monitors were given the responsibility to maintain order in the class. Teachers did not use this time for lesson preparation, but seemed to take some respite, from an otherwise relentless daily routine.

In the case of GBP, the teachers had a somewhat fluid arrangement for taking classes and classes were engaged in a haphazard manner depending on the convenience of teachers present at the school. In the course of field visits by this researcher, spread over one and half academic years, the teachers in this school were not observed spending any time during school hours in lesson preparation. At GBP, two or three standards were often clubbed together and teachers managed these classes using a variety of classroom management strategies. This is how Nalini managed on one of the days when two teachers were absent. On entering the class, she gave one set of children the task of copying something from their textbooks, while engaging with the other group of children and asking them questions about the lesson taught the previous day. Next, this group of children was sent out to the verandah to write out questions and answers and Nalini checked the notebooks of the first group of children.

Government High Schools: GAH, GBG

Unlike teachers in the primary schools, teachers at government high schools had at least two non-teaching periods on any given working day. However, these were invariably utilised for completing tasks like filling up forms, attendance and marks registers, writing letters to authorities either for their own requirements or on behalf of students, maintaining fee registers, handling transfer certificate forms, interacting with students who were transferring into or out of the school, responding to memos from the headmistress or other education authorities. Time was also utilised for correcting test papers. Since teachers handled two subjects for two classes of two sections each, they would end up correcting over three hundred test papers after every cycle of tests. On no occasion did the researcher observe teachers spend time preparing lessons prior to a teaching period.

Gayatri said that she was interested to use the OHP machine but that there was no supply of electricity to the class and that she rarely had time to prepare before a class, since the syllabus had to be finished. Further, she was already in a tight spot having had to miss some days of school due to health reasons. All the teachers in this high school had an opportunity to attend a week-long training in the use of computers to prepare teaching learning material (TLM) in the form of presentations related to their subjects and had also been discussing these in the staffroom. However, they were not able to

use the CDs they had prepared as aids to their classroom teaching as there was no electricity supply in the classrooms.

At the girls' high school also teachers utilised their non-teaching time for completing records or for corrections. However, the science and math teachers, Savita and Girija spent time going over the textbook in preparation for the lesson that they were about to teach. This did not take up extensive amounts of time and was usually done for about ten or fifteen minutes just prior to teaching. Teachers also spent time "preparing notes" for their classes. These notes were either for their own reference or were in the form of answers to textbook questions that could be dictated to the students.

Private school: PU

At this school, the teachers followed a time table that had provisions for at least one free period on each working day per teacher. Teachers utilised this time for corrections and maintaining records. On several occasions, the senior Physics teacher Shivraj spent a few minutes before a teaching period reading the textbook and making a few notes for his own use during the class. He also referred to a book of formulae and definitions in Physics which he had. Shantala also occasionally spent a few minutes before the lesson glancing through the pages of the textbook, before going to the class. In the first year of the research period, August 2006 to March 2006, Savitri was rarely present in the teachers' room and did not spend any time at school preparing to teach.

From June 2007 onwards, Savitri was assigned chemistry classes for eighth standard as Shivraj got a government appointment. Savitri had been teaching biology and was therefore anxious about teaching chemistry. She asked this researcher a detail about the construction of a nuclear reactor and mentioned spending about an hour the previous evening at home looking up the topic from a college level textbook borrowed from a neighbour who was studying in college. However, during the earlier phase of observation in this school, when Savitri was on familiar ground, teaching biology, she did not spend time preparing for teaching during the school hours, nor did she mention reading up in preparation for teaching.

International School: PI

In contrast to the relatively small amounts of school time that teachers in the other schools spent on lesson preparation, the teachers at the international school spent much of their free periods in lesson preparation activities. The teachers had daily schedules with up to one and a half hours or more of non-teaching time. Teachers were rarely seated at their stations during the non-teaching hours and preferred to utilise this time in lesson planning and discussions with co-teachers. Since the school had a clear policy whereby a new teacher shared responsibility for teaching along with a more experienced teacher, on many occasions teachers met together to discuss and plan lesson strategies. Teachers utilised the computer facilities to search for information,

lesson plans, activities and worksheets related to their classroom teaching. They also worked collaboratively with each other to design and deliver instructional activities for their classes. The class strength at international school was lower than those in the other schools and this could be one reason why teachers had to spend less time in correction work. The record keeping functions were computerised, so one did not see teachers in this school sitting at their desks, filling out registers. However, teachers used the computer facilities to update and maintain student records and class registers.

In the government primary schools, teachers did not spend time preparing for lessons, as has already been mentioned. There were no designated hours for lesson preparation in the school day. These teachers usually taught from the textbook and since all the teacher respondents had several years of experience they were familiar with the content to be taught. In the case of high schools, teachers occasionally spent a few minutes glancing over the textbook content that they were planning to teach, although this seemed to be more the exception than the rule. As described later in this chapter, teachers in all the schools except the international school based their teaching on the textbooks. The content of the textbook was often read aloud in class and translated or re-phrased by the teacher and this process did not require preparation. Teachers gave "notes" to the students in the form of answers for the questions in the textbooks. They seemed to do this with ease and during the period of this research, on only one occasion was it possible to

observe a teacher, Savitri (PU) spend time preparing notes by writing out answers to questions. Savitri mentioned that since she had newly been given the responsibility of teaching Chemistry to standard VIII she had to make extra effort. She mentioned that she was "not thorough" with Chemistry, but had been asked to teach the subject since another teacher from the school had resigned and a new teacher for the subject had not been appointed. The international school (PI) was clearly different in this respect, as teachers here were seen spending upwards of ninety minutes each day on lesson planning and preparation.

5.2 PHASES OF TEACHING

In most of the classroom interactions observed during this study, the teaching of content was structured into phases. Clarke (2001) has written about phases in the teaching of a lesson, but these refer to the structuring of instruction in the course of a single lesson, somewhat analogous to the "steps of lesson" mentioned in the chapter on teacher training in this study. According to Clarke, a single lesson proceeded in three phases – introduction, explanation, and conclusion for social studies or problem solving in the case of mathematics. However, teachers acted out praxis models in the present research did not seem to follow this patterning to an observable degree and indeed during one discussion teachers explicitly stated that they did not teach "in steps" as was expected during the B.Ed training. Sarangapani (2003) has mentioned three stages through which all lessons were taught and learned in

the Kasimpur Model Boys' School – teaching new lessons, answering questions and revision. These stages could be compared to the phases described in this study, namely an introduction-cum-explanatory phase, a note-giving phase and a revision phase. The time taken for each of these phases varied widely and it was not necessary that all the stages would take place within a single lesson. Occasionally, even the sequence of the phases was changed with note-giving getting priority over explanation.

During the introductory/explanatory phase, the teacher explained about the topic, allowed a few questions from the students and occasionally gave examples related to the content of the lesson. Sometimes, these examples were those mentioned in the textbook and sometimes, teachers provided examples not mentioned in the textbook and on a few occasions, students were allowed to offer examples from their own experiences. What follows are illustrative examples of the introductory/explanatory phase of the lesson from the different types of schools. The term explanatory phase is used in the context of a clearly demarcated time during the teaching of a science content area in which the teacher introduced the key ideas or concepts to the students. This was the time when students were provided some opportunities to ask questions and teachers tried to use examples or experiments to create interest among the students. Occasionally, teachers demonstrated an experiment during this phase of the lesson as in the instance of Shivraj's demonstration of the motion of a pendulum.

5.2.1 INTRODUCTORY/EXPLANATORY PHASE

Sarangapani (2003: p.121) described what she calls the use of "teachering device" by teachers in a school near Delhi.

> "This device was characterised by the manner in which the teacher used his or her voice and eye. In the classroom, teachers did not merely speak to their students, they addressed them. The voice was uniformly loud and devoid of the inflections and emotions that are present in ordinary speech. The words were uttered slowly with a uniform spacing. While speaking, the pitch varied in a standard manner – it remained flat for most of the sentence, rising sharply at the second last word, and after a very brief pause, dropping again to the original pitch at the last word/syllable."

The use of the 'teachering' device was observed in all the government schools, GA, GB and in the private unaided school, PU and in the case of two teachers in the international school, PI.

Government schools

In the government schools, teachers preferred to get to the textbook content as quickly as possible even if they were demonstrating an experiment. As could be seen in the extracts presented below, students did not ask questions, even during the introductory/explanatory phase of the lesson and the expectation

was that they would respond appropriately to the teacher's questions when required to do so. Teachers had a specific way of indicating the key phrases and information that had to be memorised and thus were using the 'teachering device'. Most often, teachers simply began the lesson by reading and paraphrasing or translating from the textbook.

GAH.L.1. (Kannada medium)[3] Vimala was teaching Biology to Standard X A at GAH. There were 83 students in the class – 43 girls and 40 boys. As Vimala entered the class, the students stood up and wished her "Good morning miss" in English. Vimala then wrote the name of lesson in Kannada on blackboard

"Vascular Plants"

She then asked a girl student to read. The rest of the students sat silently in overcrowded benches looking down at the textbooks open in front of them. The girl got up to read. She read fluently and the rest of the class remained silent. On the last bench, where this observer was seated, a girl was underlining and circling phrases in her text book. A boy at the back of the class seemed to be asleep. Three children were seated on the floor at the front of the class, as the benches were full and overflowing.
Vimala (raised hand, palm outward in stop sign): Unh
Student stopped reading.
Vimala: *How many groups of plants are there?*
Chorus: *Five groups – algae, bryophytes, pteridophytes, gymnosperms, angiosperms.*
Vimala: *Haven't I told you – I do not want mass answers. Answer when I ask you to and don't mass answer (pause) .How many groups of plants are there?*
Vimala: *How many groups of plants are there?* (repeated the question)
About 8 hands went up in response.
Vimala (gestured to a particular towards a boy): Unh
Boy: *Five groups - algae, bryophytes, pteridophytes, gymnosperms, angiosperms.*

[3] All Kannada language translated by the author appear in italics. This convention has been followed throughout this document. When Kannada terms are directly presented in the text, these are also in italics.

After asking some more questions and receiving answers that where chorused, despite her instructions, Vimala went on to giving an explanation about flowering plants and the role of flowers in reproduction.

In the initial days of field study, before the researcher's presence in the class came to be accepted as common place, some teachers gave a 'demonstration' type of lesson. They did not read from the textbook, but tried to introduce the content of the lesson by asking questions and giving explanations. These were clearly done for the sake of the researcher and as the researcher's presence in the classroom became commonplace, they reverted to the more usual way of beginning the lesson directly with the textbook. The extract below is one instance of such teaching, where the teacher, atypically, did not begin the lesson with the text book.

GBG.L.2. (English medium) Savita (GBG) during the initial stages of this study explicitly 'gave' a lesson because she felt that it was expected.
Savita: In our previous class, we were discussing about distance travelled by a moving object in given time and (pause) what is motion? (pause)
Chorus: Motion is the continuous change in relative position of a body.
Savita: Definitions *tandidene alwa*? [Didn't I give the definition?][4]
Students: Yes miss.
Savita: *Ade* continue *madona* (pause) Motion *andare* (pause) [*Let us continue the same; motion means*]
Girl: Continuous change in relative position of a body.
Savita (placed a chalk on the table): See this chalk, it is stationary. Its' position with respect to the table, the distance between the chalk and the table, does not change.
She next explained the same idea in Kannada, using the English words 'stationary' and 'position'.
Savita: The chalk will remain stationary till we apply (pause)...?

[4] Translated by the author

Student chorus: External force.
She elaborated the idea of inertia in Kannada.
The noticeable absence of reading from the textbook, was an exception to Savita's normal practice. She had specifically adopted this because, as she told the researcher, "You have to observe my lesson, today I will do it like in B.Ed, but all the time we won't do like this."

Savita, like the other high school teachers whose lessons were observed at GBG, resorted to Kannada every time she wanted to rephrase or explain something that she had already spoken in English. This government high school, unlike the other government high school (GAH) had four English medium sections for each standard and the fifth section was taught in Kannada. Students whose home language was other than Kannada formed the majority in the English medium sections. The textbooks used were in English and teachers often directly read out from the textbooks. However, the text was translated and explained in Kannada. Sairabano and Charumati had explicitly mentioned that the non-Kannada students, who were either Tamil or Urdu speakers, did not follow explanations in class since they were unable to understand either English or Kannada very well. During a discussion in the staff room, Savita had expressed helplessness in the matter of teaching in languages other than English or Kannada, despite such requests from parents of Tamil- and Urdu-speaking students.

Despite attempts to explain that the purpose of the study was quite different, Girija (GBG) undertook a demonstration of magnets specifically and explicitly because of an assumption that this researcher was there to observe

and comment on her teaching in the manner of inspectors. In the class with magnets, it was noticed that Girija did not use the textbook at all, but was anxious to 'perform' her lesson in what she believed to be a manner close to the ideal: i.e., without taking recourse to the textbook and using a demonstration to "motivate" students. It was evident that she had planned and scripted her performance when she got to the end of the script and there were still a few minutes for the end of the period. She said to the researcher, *"Finished, there are two minutes left."* Without realising that she was performing, the researcher requested her to carry on and then noticed her discomfort as she said, "*Finished, next magnetic fields, there isn't enough time to do. Even no time to write questions and answers."*

Apart from these demonstration type lessons observed at the beginning of the field work, it was mostly the case that the teacher went into the classroom textbook in hand and then asked the class for the location in the lesson where the previous class had stopped and simply began at that point. Some examples of this instructional style follow:

GAH.L.3. (Kannada medium) Children were seated on the floor and there were 83 students, sitting knee to knee. Boys sat in loosely ordered rows on one side and girls similarly on the other. There was a narrow walking space between the boys and the girls. Gayatri started by taking roll call. She was seated on a metal chair which a boy had fetched into the class. There was also a table in this class room. She was dressed in a *salwar kameez*, which was unusual for a teacher. She had joined work after a bout of illness requiring abdominal surgery.
Gayatri (while taking attendance): *Why are you talking? Don't you want attendance?*

Gayatri: *What were we studying?* (without leaving her seat)
Chorus: *Electricity, magnetism.*
Gayatri: *What have we learnt?*
Indistinct response from some students.
Gayatri: *Have we finished magnetic lines, electromagnetism and the experiments?*
Gayatri (flipped through the textbook and muttered): *What edition is this?*
By now Gayatri had moved to a position in front of the desk and was standing up in front of the students.
Gayatri: *Right hand rule.*
She stated the right hand rule used to determine the direction of magnetic field produced around a conductor when electricity flowed through it. Gayatri gripped a chalk in her right hand to represent the current carrying conductor. She then drew the same on the board and explained. As she explained, she emphasised the key points by rephrasing them as questions.
Gayatri: *Imagine that you are holding a current carrying wire in your right hand* (emphasis). *Which hand?* (pause)
Chorus: *Right hand.*
Gayatri: *The thumb should point in the direction of the current.* (Repeats) *In which direction should the thumb point?*
Chorus: *Direction of current.*
Gayatri: *The direction of the fingers around the wire will give the direction of the magnetic lines of force around the wire. The magnetic lines of force will be in the direction of the fingers round the wire. In which direction will the magnetic lines of force be?*
Chorus: *In the direction of the fingers round the wire.*
Gayatri: *Don't try to hold a live wire in your hand ok – this is just to show the direction of the magnetic lines of force round the wire. This is the right hand rule (emphasis)(pause). What rule?*
Chorus: *Right hand rule.*
Gayatri: (naming a boy) *Read the experiment. Do it yourself.*
Boy: (Rapidly read the section titled "Do it yourself" in the textbook)
Several of the girls did not have textbooks; the entire first row of girls did not have a single textbook between them. Not all the boys had their textbooks either. As the boy read, Gayatri interrupted him to paraphrase what had been read. She rapidly rephrased the steps described in the textbook and then asked two questions.
Gayatri: *Instead of the conductor being straight, it is* (pause) *circular. Instead of the conductor being straight, it is ...?* (rising tone) (pause)
Chorus: *Circular.*
Gayatri: *The magnetic field will be* (pause) *inside* (emphasis). *Where will the magnetic field be ... ?* (pause)
Chorus: *Inside.*

The boy again continued to read from where he had left off. He read rapidly and fluently. Several children could only listen and not follow the text in writing as they did not have textbooks. Most of the children seemed attentive. A few children were yawning in the back rows. While some students were looking into a shared textbook, others were having a quiet conversation/exchange.
Gayatri explained the experiment after the boy stopped reading. She went up to draw the diagram from the textbook on to the board and as she drew she elicited choral responses from the class as a device to hold their attention. The experiment was about a magnetic field that is produced when electricity flows through a conducting wire that is circular. She kept eliciting the chorus response. She held the students' attention by being fairly loud and by rotating her gaze around the classroom. No student activity was observed apart from listening and responding in chorus when Gayatri talked.
Gayatri: *How can we test for magnetic field in the experiment?*
Some boys tried a tentative response.
Gayatri: *We cook rice, how do we know it is done? How do we know there is magnetic field?*
Boy1: *By eating* (laughs softly).
Overlapping responses by some boys: Shock.
Gayatri (laughing): *That is for electricity.*
Boy2: Tester.
Gayatri shook her head to indicate that this was not so.
Boy3: Compass.
Gayatri: Hunh (accepting), *then also we can use iron filings.*
She explained how the filings can be spread on the cardboard, which must then be tapped so that the filings can line up in the magnetic field. She explained how a compass or iron filings could be used to detect magnetic fields. She proceeded rapidly, occasionally eliciting a choral response.

In the transaction in the physics lesson, one noted the use of what could be called a "teachering device". In this case, it was used as a way of alerting students to the sections of the text they needed to take note of and later commit to memory. These sections of the text were also emphasised by the teacher in the form of a speech and response pattern characterised by appropriate voice inflections and pauses. Key phrases were repeated by the teacher to emphasise their importance. The emphasis on the last word

followed by a pause indicated to students that they were expected to respond by repeating the emphasised phrase. A similar instructional style could be seen in this classroom transaction, recorded at the primary school, GAP.

GAP.L.4. (Kannada medium) Shanta was teaching a lesson about elements and atomic structure to standard VII B. There were 40 students seated on the floor with walking space between the boys and girls. There were equal numbers of boys and girls in the class. At the beginning of the lesson, Shanta spent about five minutes asking questions about the content that had already been taught. For each question, children responded in chorus. After this, Shanta started reading from the text book and at times, rephrased the content in the form of questions without reading the text out aloud directly.
Shanta (read out from the textbook, which she held very close to her eyes): *There are three types of elements:* (pause) *metals, non-metals and inert gases* (emphasis). *How many types of elements?*
Chorus: *Three.*
Shanta: *Who discovered the atom* (emphasis)? *English scientist John Dalton* (emphasis). *Who?*
Chorus: John Dalton.
Shanta: *John Dalton from England* (emphasis). *Where is John Dalton from?*
Chorus: England.
Shanta: *When did he live* (emphasis)? *1766-1844* (pause). *When?*
Chorus: *1766-1844.*
Shanta: *The points of atomic theory. Atoms can neither be created (emphasis) nor destroyed* (emphasis). *Atoms can neither be* (pause) *created* (emphasis).
Chorus (overlapping): *Created.*
Shanta: *Nor* (pause) *destroyed* (emphasis).
Chorus (overlapping chorus): *Destroyed.*

Once again the "teachering device" was in evidence in the way Shanta used her tone to emphasise the parts that had to be remembered and in the way she used questioning as a way of getting children to repeat key information from the lesson.

In the following extract from a X standard Physics lesson taught by Sharada at GAH, one could observe how the teacher taught by having a student read out sentences from the textbook and then re-phrasing the same.

GAH.L.5. (Kannada medium) When the researcher entered the class (already underway), a girl was standing with the textbook and a boy was drawing on the board. Sharada was holding the textbook open in her hand. She was turned towards the boys and her back was to the girls. She was reading and rephrasing from the textbook and elicited choral responses as she went along.
Sharada rapidly read two sentences from the textbook, re-phrased them and gestured with book to show turns of coil in generator. She told the girl to read on. The girl read one sentence and Sharada re-phrased what had been read. Everything was said quite rapidly using technical terms in Kannada. Only some of the boys were looking at Sharada as she explained. Others had their eyes on their textbooks.
Sharada: Next.
Girl read another sentence and Sharada read the last phrase of the sentence along with the girl. Sharada again rephrased the sentence by way of explanation.
Sharada: Next.
The girl read another sentence.
Sharada (to boy drawing on the board): *Are you done?*
She went to the board and wrote ABCD to mark the corners of the generator coil.
Sharada: *ABCD is a coil.* (pause) *What is ABCD?* (pause)
Chorus: *Coil.*
Sharada (marking points on the diagram of the generator drawn by the boy on the board): *B1 B2 are the carbon brushes.* (pause) *B1 B2 are carbon...?* (pause)
Chorus: *Brushes*.
Sharada (marking more parts of the diagram): *R1R2 are the copper rings.* (pause) *What are they?*
Chorus: *Copper rings.*

Private school

The introductory/explanatory phase was a feature of science teaching in the private school, PU also. However, there were several differences. The private school differed from the government school in the amount of time allocated by teachers to spend in the classroom attempting to provide students with a handle into the lesson to be taught. Teachers often devoted an entire 40 minute period for this. The next available period was then utilised for the note-giving phase of the lesson., In In the government schools, teachers typically spent a few minutes at the beginning of the lesson for introduction/explanation, but at Tunga Public School teachers curtailed the time spent on this phase only when time available was constrained due to teaching periods being taken up for extra-curricular activities. Since this school was an English medium school, all the lessons were taught in English. Unlike, GBG, where teachers translated English sentences into Kannada, teachers at Tunga did not change languages during teaching.

This phase was clearly demarcated by most teachers as separate from other phases by explicitly requiring students not to use their textbooks or notebooks. There was a greater degree of student participation in comparison with government schools and teachers introduce the chapter to be studied by using talk, questions and a somewhat interactive mode that allowed students to ask questions.

Individual teachers differed in the way they organised this phase of their teaching. The amount of time allotted for this phase of the lesson varied with the time available in the annual work plan of the teacher which often had to be modified to accommodate contingencies like periods given over for sports day practice, annual day function rehearsals, or inter school events conducted by external agencies like ISKON (a religious organisation) or a shoot for a televised quiz programme.

It seemed when a teacher was confident about his/her knowledge in a given content area to be taught, he/she would spend longer explaining the topic and possibly allow for more student interaction. The following extract is from the introductory phase of a lesson taken by Shivraj. The entire 40 minutes were given over for talk and discussion

PU.L.6. (English medium) After Shivraj recalled earlier lessons by asking students to recall the "three parts of an atom", he mentioned that atoms could lose or gain electrons. Next, he proceeded to draw the diagram of an atom: a small inner circle had PN written inside and concentric circles were drawn around it. Though he did not mention it in this lesson, students had already learned from earlier lessons that electrons revolve around the nucleus.
Boy (responding probably to the diagram, rather than the teacher's statement about atoms being able to gain or lose electrons): When you said that electrons revolve round nucleus, that time all electrons will have same speed, sir?
Shivraj: Ah (emphasis) yes, atoms can gain or lose electrons. (pause) Naturally, we know electron is negative, (pause) negatively charged electrons are anions, positively charged electrons are cations. (emphasis) What is cathode in electricity?
Girl: Positive.
Shivraj: Cathode is positive. (pause) Who said that? We learnt in last class, dry cell. Is cathode positive or negative?
Girl (softly): Positive.
Shivraj: Positive?

Students (very low voices): Negative.
Shivraj (smiling): If it is not positive, it is negative. Is it not? Cathode is negative, anode is positive.
He wrote on the board.

"cathode is -ve
anode is +ve"

Girl: Sir, you said cation is positive, no sir?
Shivraj: Yes cathode is negative, both are correct. When current is passed through a solution of electrolyte, what will happen? There are two electrodes. One is connected to negative terminal of cell that is cathode. Other one is connected to positive terminal. It is anode. The positive ions will get attracted to the negative and go towards it – that is why they are called cations. Because they will go to the cathode. The negative ions will go to the positive side, the anode, so they are called anions. You will study it in IX class.
Shivraj drew a diagram of an electrolytic cell to illustrate the explanation.
Boy: Sir, if electrons they will keep on gaining, what will happen?
Shivraj: Orbits will have fixed number of electrons. First shell two, second eight. It is like children sitting on bench – first row has place only for two students, second row eight. If one more comes it will not accept.

There were several notable features in this episode. Shivraj left the question about the electron speeds unanswered, possibly this was because he was not sure about the explanation. On the other hand, he gave explanations to clear up the confusion the girl seemed to be having about cations and cathodes. He also attempted to answer the boy when he asked about atoms gaining several atoms. This could be interpreted to mean that it was important for Shivraj to appear knowledgeable before the students and he would avoid talking about phenomena that he was not knowledgeable without explicitly stating that he did not know the answer.

Sarangapani (2003) discussed the important function of teaching in defining and maintaining the 'frame' of the school curriculum. "The frame was detectable not so much in the presence or absence of everyday knowledge in

the classroom, but more in whose and what knowledge became legitimised by entering into the classroom discourse" (p. 161). As Sarangapani mentioned, the teacher's exercise of pedagogical authority had both instructional and regulating function. She drew attention to teacher's authority being 'moral-cum-epistemic'. A weakening of epistemic authority that would ensue from explicit admission of ignorance would presumably have weakened the moral authority of the teacher also and lead to a concomitant weakening of the frame. Since the frame is a social construct, it acts as a 'symbolic ruler of consciousness' (Bernstein, 2000: p. 185) and its reality is upheld by participants – in this instance, the teacher and his pupils.

It was remarkable also that the girl student should repeat her answer about cathode being positive, even after the response from Shivraj indicated that she should rethink her answer. It would have more typical if she had immediately reversed her answer. The girl was the leader of the class and had a badge that indicated her status. In her schematic of authority relationships within the classroom, Sarangapani (2003, p.107) had shown a position between the students and the teacher, marked as 'monitor' that could be said to be analogous to that of the leader position held by the girl. It seemed likely that it was her status that allowed her to pose a small challenge to the teacher's knowledge. It was also interesting to note the automatic, but muted, response, "negative" that came from the rest of the students after Shivraj's feedback indicated that "positive" was incorrect. The hesitation could have been

stemming from trying to decide which of the two authorities in class was correct. Shivraj was still playing along at this juncture and had not decisively revealed the correct answer. The boy who raised the questions about electrons also had a leader badge.

When the teacher had to teach an area that was unfamiliar, the tendency was to work with a lesson script and quickly pass on to the note-giving stage. This was observed in the case of novice teachers also and has been described in the chapter on teacher preparation. Notes in the form of questions and answers could be prepared before hand and dictated to the students. Savitri spent an entire period talking about the human digestion without the aid of textbooks or notes, but when she had to teach Chemistry, because another teacher had left, she used half the class time to state the key points of the lesson and then proceeded to write out on the board a worked example provided in the textbook. The students were then asked to copy this down. No room was created for student response, by initiating interaction through questions as was the usual practice.

Arati seemed to be very conversant with the biology topics that she was teaching and used a mixture of talk, questions, reading from the textbook and note-giving – sometimes doing all this in the course of a single period. What follows is an extract from a biology lesson taught by Arati to IX standard.

PU.L.7. (English medium)

Arati (as she wrote the question on the board): What is meiosis?

A few hands went up. Arati's expression was one of pain as she paced around the class.

Arati: Who can answer?

She went around with a grimace. She ignored a girl who stood up to answer. Another girl who had put up her hand was also not permitted to answer. She called on a boy who had also put up his hand to answer.

Boy (a little hesitant): Reduction division.

Arati drew a diagram of a somewhat square-shaped cell on the board and within the square she drew a circle with a jumble of criss-crossing lines to represent the nucleus.

Arati (pointing to the nucleus she had drawn): What is it?

Some students talked in very low tone among themselves.

Arati: Don't whisper. Get up and answer loudly even if it is wrong.

Arati: During sexual reproduction, sperm and egg unite and if each they contain 46 chromosomes, the fertilised cell will have 92. It does not become 92. How is this possible? Sperm and egg unite (crossed forefingers to show union). Half comes from father half from mother. It is because in meiosis, the chromosome number is reduced to half. This is the haploid number. That is why meiosis is also called reduction division.

Arati drew on the right of the board, across from where she had drawn the previous diagram of a cell. She drew a grid with four spaces and in each space drew a circle to represent the nucleus.

Arati: Meiosis has two phases, meiosis one and meiosis two. Meiosis one is reductional division and meiosis two is equational division.

Arati: What are the phases in meiosis one? (pause)

Chorus (As Arati wrote these on the board, radiating from the word meiosis): Prophase one, metaphase one, anaphase one and telophase one.

Arati: Drosophila melanogaster has eight chromosomes. (pause) Homologous chromosomes come to the equator region (pause). I have explained already (pause). I will just draw.

She drew two square-shaped cells with what looked liked an X (representing a chromosome) +3 written inside the nucleus circle. An arrow from the drawing pointed to the word meiosis II. As she drew and labeled, the class was very quiet and watched her.

Arati: Significance of meiosis. Now (pause) (as if saying softly to herself). Significance of meiosis is (pause) these four follow germ cells. The number is reduced to half (pause). Number should not be changed from generation to generation (soft chorus from students accompanies this). Number is maintained (repeat). For billions of years, there is no change in the number of chromosomes in our cells. Next (pause), genetic exchange (pause) not mutation (pause). I will explain later. Next, (pause) differences between

mitosis and meiosis (pause). I should give you differences (pause). I have explained. Now whatever you have understood you tell me (pause).
Students started flipping the pages of their notebooks.
Arati: Don't look into book (pause). Some of you have taken notes (pause). Tell whatever you have understood. Tell. If it is wrong, I am there to correct. (Turning to boys suddenly) This is very boring topic to boys, it is not going to help you in your future. But for now you have to answer. I know it will help you sometime.

Shantala, who taught physics and chemistry at PI, differed from Arati in her teaching style. She was very methodical, and during the introductory/explanatory phase, the students in her classes were clear that they were not expected to use their notebooks or their textbooks but were to listen to the teacher and respond only when explicitly required to do so.

On the whole, the teachers of this school did not usually read out the textbook directly in the classroom thus conforming to the common ideal held by both sets of teachers, those from the government school and those from the private school. The government school teachers, on the other hand, taught without taking recourse to the textbook only when they were giving a 'demonstration' lesson which they felt would be observed or evaluated.

International school: PI

One could observe a range of different modes of teaching at this school. Kaveri and Meena, who both taught the ICSE sections in the school, followed a teaching style more or less like the teachers in the government school and

the private school. The following is an extract from a chemistry lesson taught to IX standard by Meena.

PI.L.8. (English medium)

After angrily refusing to grant the students' permission to go for choir practice instead of attending chemistry, Meena managed to have the students seated. There was silence and the students had settled down in their seats.

Meena: Last class we did (simultaneously wrote on the board) P -one V -one over T-one is equal to P- two, V- two over T- two. I derived it.

On the board

"P1 V1/ T1 = P2 V2/ T2"

Boy 1 (quiet voice): I didn't understand

Meena verbalised this derivation rapidly. She wrote down the three equations dealing with change of volume with pressure, change of volume with temperature, and change of pressure with temperature and then combined the equations algebraically to arrive at the relationship she had just mentioned.

Boy1: If P- one V- one over T- one equals P- two V- two over T- two then P- three V- three (Interrupted by teacher)

Meena: Yes, obvious. (pause) One minute Rohit. What is standard temperature and pressure? (pause)

Meena (to some girls): Go! I don't want all this eye contact and all. If you are not interested, go! If I get five interested students, enough for me. Others, if you are able to do this on your own, go! I will not do it again!

[Meena seemed to have noticed that some girls were trying to catch each other's attention and were distracted. She seemed angry at their noticeable lack of interest in what was being taught and addressed them briefly before proceeding with the lesson].

Meena gave the example of hydrogen gas being produced by the reaction of zinc with hydrochloric acid, and then explained standard temperature and pressure.

Meena: Standard temperature is 273 K or 0degree C. Standard pressure is one atmosphere.

Two boys: Why 273K?

Meena: Because it is 0 degree C, and -273 is absolute zero. Because if temperature increases, pressure will change, so we take standard temperature.

Meena wrote on the board.

"Std. temperature is 273K or 0degreeC.
pressure = 1 atm"

Girl 1 asked about the standard temperature and pressure and Meena again gave more or less the same explanation that she had just given.

Boy 1: For any substance, if we multiply P one V one, it will be the same?

Meena: Yes.

Boy1: For all substances?

Meena: No, of a (emphasis) substance.
Boy 2: (softly): For a given mass of substance.
Girl 1: From the three laws you got P one V one/ T one = P two V two/T two (pause). Won't the laws clash?
Meena: No! (to girl) If you have not understood, I cannot take it up again now. Now I will give you problems.

The following extract is from a lesson being taught by a team of two teachers.

During this lesson, two teachers Sheela and Bindu K were together teaching a

lesson about food groups to VI standard. The students were sitting at their

individual desks and had their notebooks out and open.

PI.L.9. (English medium)
The lesson proceeded with teachers eliciting the expected answer from the children and then elaborating on the function of cellulose fibres in food. After that, the teachers reminded students about the work that they had to do for an ongoing project about carbohydrates.
Bindu: One thing we forgot to tell you (pause), please write down – is that fibre also prevents cancer. When you all laugh about constipation, remember it is a serious thing.
Sheela: Write down.
Bindu wrote on the board the sentence that the children were to copy.
Sheela: Class, look this side. There is an extra point for homework; so carbohydrate visuals are due next week.
Sheela wrote on the board.
"Carbohydrate visuals are due next week"
After this, the students moved to a carpeted area and sat down in a loose circle for more interactive discussion about food and food groups and talked about their parents' food preferences or calorie consciousness. Sheela read out an article from a magazine about food myths and students asked several questions. Teachers too asked student questions, at times directed to a particular student to monitor whether the student was paying attention to the discussion.

The two phases of this lesson were clearly distinguished by the seating

arrangements. For the discussion phase, when students did not have to write

things down, they sat on the carpet, whereas when the teacher wanted the class to note down specific points in writing, the students were at their desks. Unlike in the private school, the note-taking did not follow the discussion, but rather the other way round.

The structuring of the lesson though evident could be said to be looser, and the discussion phase had a lot more questions coming from the students. During this particular lesson, no textbook was used. A great deal of information was conveyed through elaborated talk and only the key points were written down for the students to copy.

In another lesson, that was also taught by two teachers, there was reference to a 'mind-map' about a topic on tiger conservation that the students had done earlier and a lot of discussion took place on the basis of the previous work done by the students on their 'mind-maps'. Presented below is a brief extract from a class that involved nearly 60 minutes of lively discussion.

PI.L.10a. (English medium)
Mohan: Why are we talking about tigers? Why not ants?
Maya: Much more endangered is *Rana tigrina*.
Mohan: Let's see why tiger?
Boy 1: Charismatic – it is a charismatic animal, we get attracted.
Started writing responses on the board
v. Charismatic
Several students: National animal
Mohan stopped when the word national was mentioned and had an impromptu little quiz.
Mohan: Tiger is the national animal, which is the national song?
Students (some of them): *Vande mataram*
Mohan: How many of you can sing it?

He did not write the word “national animal” on the board and went on to elicit the next answer to why tiger conservation:
Several students responded in overlapping voices and also were talking among themselves.
The next word Mohan puts up on the board after students responded was “endangered”.
There was further overlapping student talk about the tiger in the ecosystem, it being a top carnivore and keeping the herbivore population in check, etc.
Mohan: One at a time.
Boy 2: Tigers are important for the ecosystem. They are predators for deer. If no tigers are there, the deer population will increase and they will eat up all the vegetation. Tigers keep the balance.
Mohan: How many of you agree with this? Those who agree put up your hands.
About eight hands went up.
Mohan: How many of you disagree? Put up your hands.
About three hands went up.
Maya: Anil, if you have something to share, raise your hand.
Anil (indistinct): Biodiversity.
Maya and Mohan: He didn’t say that.
There was talk from the students about biodiversity and food balance in the ecosystem.
Maya: Whenever you talk about balance, biodiversity is the hidden word. (pause) (Suddenly looking at a boy in the class) SIT UP straight. If you do not listen and participate in the class, I can single-handedly take both of you out of the soccer team.
She then proceeded to deliver a homily on the importance of maintaining an upright posture and the consequences of not listening in class.
Girl1: To save the tiger, you have to protect its habitat. This means that the forest in which the tigers live has to be protected. All the other species in the forest also get saved.
Maya and Mohan pick up on this idea and ask non-listeners to repeat what the girl had said.
Boy 5: I couldn’t hear one or two words
Maya: She spoke quite clearly, didn’t she?
Mohan: Can someone repeat it?
Girl2: When we try to save the tiger, we also have to protect its habitat. The tiger lives in the forest, so along with saving the tiger, by protecting the forest, other species also get saved.
Mohan: I will take the idea of frog. The tiger has a much bigger range than the frog. In order to meet its requirement, the tiger needs a lot of area as compared to the area required for a frog to survive. By protecting the range of a tiger, we conserve a much larger area.

Boy7 (so far silent): Tigers are killed for bone, fur, medicine. So to prevent unethical things, we save the tigers. For frogs, this doesn't happen.
Several students turned to Boy7, and some indistinct but irritated responses were made to his comment.
Mohan: Frogs are endangered too. A lot of frogs are exported because their legs are considered a delicacy.
Maya: Tiger bones are not really medicinal, but people believe that they are. This is psychological, but it still means that tigers get killed for their bones. The range of a tiger is very large, like from here to MG road.
Students talked about the whether it was better to conserve frogs or tigers.
Boy 6: To save tigers, a very large area has to protected
Boy8: Frogs don't need such a big area. Frogs can be saved even if they are endangered. A frog can produce many frogs in one pond.

In both these classes, there was a more conversational style of talking and students had opportunities to talk about their ideas instead of recalling correct answers. There was no clearly discernible use of the 'teachering device', except in Kaveri's classrooms. Unlike Shivraj's class at the private school, where the students asked questions, but expected that the answer should come from the teacher, in the lesson taught by Maya and Mohan, there were several instances where students discussed among themselves and also put forth ideas that were not accepted or rejected outright by the teachers. It was also possible to note how the teachers picked up on some key concepts and ideas articulated by the students and drew students' attention to these. There were many variations in the instructional discourse during the transaction of lessons in the international school. There were much fewer variations in the instructional discourse recorded in the classrooms of the other schools.

5.2.2 NOTE-GIVING PHASE

In the government schools and private schools, 'notes' consisted of answers to the questions given at the end of each chapter in the textbook. The answers were constructed by the teacher and dictated to the students, or written on the board for the students to copy. Providing students with a set of questions and answers was called "giving notes". When short of time, teachers handed over their own notebooks with the questions and answers written down to the class leader or monitor who would then write these on the board for other students to copy. Students 'learned' the lessons by memorising the answers.

Government schools

Giving notes was the most important part of the lesson transaction in the government school and as teachers would ensure that this activity was done, even if they did not find time for the explanatory phase of a lesson. On several occasions towards the end of the second trimester, with the examinations close at hand, teachers at the primary school grabbed whatever periods they could to 'give notes'. Shanta explained to the researcher that she was giving notes first and would elucidate the lesson, if she managed to find some periods, later, but the priority was to give notes.

At government primary school, GAP, sometimes teachers would complete some explanation and then expect students to 'take notes' later, even if questions, answers or diagrams were presented on the board in a form that

could be copied. A few students quietly copied these down before being explicitly instructed to do so. Other students would then complain to the teacher, saying that a particular student was copying when he was not supposed to be doing so. Shanta and Vijaya rarely bothered to respond to these complaints. The class leaders and high achievers were the students who copied ahead of time and the teachers strategically deployed these students to ensure that the notes were transmitted to the other students when the teachers were not able to be present in the class.

When teachers were busy with two classes simultaneously or when they had a lot of record -keeping work to do, the class leaders were asked write questions and answers on the board and see to it that other students had also written these into their notebooks. The class leaders copied notes from the teachers' notebook containing the questions and answers to the lessons. Instructions were given to the students on how to write in their 'neat' as the copy books were called. The questions had to be written in red ink and the answers below each question had to be written in blue. Sometimes, teachers would dictate questions, telling students to leave appropriate spaces for the answers, which would be dictated later, when more class time was available. Students were expected to get their 'neat' work checked by the teacher and memorise the questions and answers.

Students were not expected to copy down points of the lesson written on the board by the teacher during the introductory/explanatory phase of the

lesson. Most students generally waited for the teacher to give the notes that they could then memorise. The episode below illustrated students' awareness of this rule.

GAP.L.11. (Kannada medium) After eliciting reading and paraphrasing the first two pages from the lesson atomic structure, Shanta wrote the points on the board, beginning with two statements about John Dalton, followed by points of the atomic theory. Only a few children copied this down. Some girls were yawning and a boy also yawned. A boy who was not writing was asked why he was not writing and he replied, "*I have to write later*." Another boy who was copying Shanta's points into his notebook was asked, "*Why are you writing?*" and he replied, "*I should not*." and handed his notebook to the researcher. The researcher told him to write if he wanted to. He borrowed a pen to write. These exchanges were conducted in low whispers so as to not draw the attention of Shanta or otherwise disturb the other students.

Students were clearly aware that they were not supposed to be writing notes unless explicitly told to do so by the teacher and would be reprimanded if caught writing down when not required to do so. On the day after this incident, Shanta proceeded to dictate questions from the textbook and then answers to these, which the students duly wrote down as notes in their 'neat'. Two boys who had not brought their 'neat' were scolded and slapped by Shanta. However, the boy who had quietly copied the points down from the board in the previous lesson was asked by Shanta to read out these for the others to copy. Thus this boy, who turned out to be the class leader, knew that his role exempted him from the general rule of not making notes unless told to do so. He was able to assist the teacher in transmitting the correct answers to the questions. The other underlying assumption was that apart from the teacher

and a few select student leaders, others in the class were not to be allowed to construct their answers but had to be trained to reproduce the 'correct' answers.

GAH.L.12. (Kannada medium) While taking a lesson on electricity in IX standard, Gayatri interspersed note-giving with some explanation, probably as a way to save time. She also used the 'teachering device' to enable students to remember the salient points of the lesson.
The boy read out another experiment from the textbook and then he proceeded to read the questions from the textbook.
Boy (reading out from the textbook): *What happens when you bring a compass near a live conductor?*
Children wrote down the question in their note books.
Boy (reading from textbook): *Describe Maxwell's rule.*
Gayatri: *Describe Maxwell's rule*
Gayatri (dictated the answer): *The needle flips. The reason is the magnetic field produced by the current in the conductor.*
Gayatri (dictated answer): *If a current carrying wire is held in the right hand such that the thumb points in the direction of current, then the direction in which the fingers encircle the wire will give the direction of the magnetic lines of force around the wire.*
Children wrote out the dictated answers in their notebooks. One student confused the question for the answer to the previous question when Gayatri dictated the second question before dictating the answer to the first question. The boy asked if it was the answer. She stopped and responded that it was the 2nd question and not the answer to the first question. She then proceeded to rapidly call out the answer to the first question. There was mild laughter in the class at the boy's confusion. Gayatri then rapidly called out the answer to the 2nd question. She asked the children to write the other questions and then realised that very few children had the textbooks.
The boy then read out an experiment about using a galvanometer and also about ammeter and voltmeters. Gayatri explained about various meters.
Gayatri: *All meters are like* compass. *If there is A, it is* ammeter, *if there is* (pause) *it says V on the meter, it is* voltmeter. *It is all measuring current* (pause) *like meters on a scooter or motorcycle.*
Boy (soft response, not heard by teacher): *It measures petrol.*
Gayatri: *If it says A (*pause*), it is* ammeter.
Gayatri: *If it says V (*pause*), it is* voltmeter.
Gayatri: *On scooter, there is only one,* (pause) *on motorcycles you have two, one measures the speed and another measures the fuel. If it is A* (pause), ...?

Chorus: *It is* ammeter.
Gayatri: *If it is V* (pause)...?
Chorus: *It is* voltmeter.

The following episode of note-taking was from a Physics lesson taught by Sharada to standard X at GAH. Sharada explicitly mentioned the time pressure she was under to complete the portions.

GAH.L.13. (Kannada medium)
Sharada (suddenly to boy in front): *What is that* Aanh (very loud).
(She hit him on the head with her open hand.) *Have I given notes last time?*
Chorus (muted): Oonh.
Sharada: *Take it out.*
Students started taking out notes.
Sharada (to boy): *You don't have it – leave the class* (loud, angry).
The boy did not leave immediately, but Sharada glared at him and eventually pulled him out from his place and pushed him out of the class.
Sharada: *Start writing. Describe the working of a DC dynamo.*
Sharada (to researcher as children wrote the question and copied the working of the dynamo from the textbook): *I have to finish five chapters by September. I was not on leave, I was deputed as inspector for language, I lost 5 days, then I was sent for (not intelligible), so then I lost 8 days. Now I have to cover up and finish the portions for the September exams. Students will suffer otherwise. Even if I am deputed, I have to cover the portions.*
Sharada (to class): *Next question* (pause). *What is Fleming's Left Hand Rule?* (pause) *What is an electric motor?* (pause) *Mention any six appliances with DC motor?* (pause) *What is the difference between a dynamo and a motor?* (pause) *Dynamo converts Kinetic energy to electric energy and motor converts electricity to Kinetic energy. Shall we do the next lesson?*
Sharada (to researcher, as the bell sounded): *I am continuing with this class. You could leave now.*

Private school

One noticeable difference between private school PU and the government high schools GAH and GBG was that at the private school, the teaching of lessons

had started almost a month ahead. The teachers in this school, Shantala, Shivraj and Savitri did not give notes when they were introducing the lessons. When lessons were being introduced, students knew that they were not expected to write and would not have their notebooks or textbooks open on their desks. Notes were given in the manner similar to that described in the case of teachers at the government school. This is an extract from Savitri's note-giving class for VII standard.

PU. L.14. (English medium) Savitri entered the class five minutes late and without any greeting or preliminary instructions, straight away started writing questions on the board. She read aloud the question as she wrote on the board.
Savitri: Name the types of tissues present in plants.
On the board-

Q : Name the types of tissues present in plants?

Savitri pointed to a boy on the last bench.
Boy: (stood up) Examples, miss?
Savitri: Name the types of tissues present in plants.
Girl (first bench): Xylem and Phloem
Savitri: Name non-vascular tissues.
Class: (soft, hesitant voices) p ..p..
Savitri: On surface of plant (pause).
Girl: (softly): Bark .
Savitri (does not appear to have heard her answer) Last time I taught (pause). You have forgotten.
Savitri (lists down on the board):

1. Protective
2. Conducting or vascular
3. Supporting
4. Meristematic

Savitri: What I have taught, you have to read and come.
Class (overlapping responses): No textbooks, miss. They have not given.
Savitri: So you could have read from your notes.
Savitri (wrote the next question on the board):

14] What is meant by conducting tissue? Mention its type and function.
Savitri (as she wrote she read aloud.): What is meant by conducting tissues? Mention its type and function.
In response, some children said xylem and phloem.
Savitri (wrote the answer to the question on the board):
Ans: In plants, there are some special tissues present which help in conducting food and water. They are called conducting tissues or vascular tissues.
Savitri: Shall I rub this side?
Chorus (softly): Yes miss.
Savitri: Write in next line.
Savitri had written first on one half of the board, which she has erased.
The class copied silently, a few children looked into their neighbour's notebooks. One girl in the last bench erased what she had written and then proceeded to look into her neighbour's notebook and copy.
After writing on the board, the teacher stepped off the teaching platform and walked in the space between the benches.
Savitri (used a scolding tone, to a boy who seemed to have some sort of toy): What is this? Keep it inside.
Savitri (to another boy): What is the use of writing on the board! (looking into the boy's notebook).
Savitri proceeded to the board to write the next question and the class continued in this manner.

Savitri mentioned that in the private school where she had taught earlier, notes were not given in this form, but consisted of a set of sentences that summarised the main points of the lesson.

In this school, student leaders kept track of what notes had to be given and what had been completed. Shivraj and Shantala relied on these students to keep track of the lessons and note-giving. The leaders were, in several instances, anxious to know whether certain questions and answers had to be copied down in the form of notes or whether they were to be done in the 'rough notebooks'. When teacher time was in short supply, these students

were given the responsibility of writing the notes on the board for the rest of the class to copy down.

International School

There was no process of note-giving in the international school, but teachers used the blackboard to write down key points and expected students to make a note of these and in VI and VII standards provided opportunities for the students to do so. However, the major difference was that students were not expected to rote learn fixed answers to a set of questions and there was a clear expectation that students needed to construct their own text in response to questions posed by the teachers.

5.2.3 REVISION PHASE

Sarangapani (2003) wrote about teachers feeling that in order to be considered a good teacher, they should repeatedly revise lessons, so that children would be able to perform in examinations with ease. In the government school, this need was exacerbated by the accountability system imposed by the state education department that directly linked teachers' salary increments to student performance in the examinations.

Government schools

During the period of this study, the schools were following the trimester system with three examinations in the course of the academic year. Students

were told to memorise the questions answers and then quizzed in the classes by the teacher or monitor. On some occasions, students formed groups and quizzed each other on the questions.

In December, just ahead of the second trimester examinations, standard VII student were going through a revision class. Shanta was busy with some correction work and had asked the class monitor to read out the "fill in the blanks" exercises. The students had been told to memorise these from the notes that had been given at the end of each lesson. As per Shanta's plan, each day the children would be given practice answering a particular type of question – after fill in the blanks, they would be memorising short answers comprising of a single sentence and then answers of two sentences, then answers which Shanta categorised as "scientific reasons". Several students wrote out the answers again as they were being chorused out in class. During another revision class, students had to copy out two sentence answers which were being written on the board by the monitor. In both classes, the monitors had compiled these answers from their notes and were given the responsibility of making their classmates revise the same.

On two occasions, teachers explicitly mentioned that they were using the innovative methods they had learnt at the in-service training workshops. On one of these occasions, the teacher said that she was going to make the students do 'group-work' while she entered unit test scores into a register. The students of class VII B of the government model primary school were then

asked to sit in five groups on the floor. Since the students already knew which groups they belonged to and were in any case seated on the floor, this did not take more than about half a minute. Given a class strength of 45 students, there were nine students per group and each group had a leader. The groups were then told to study the science lesson in preparation for the term-end examination in December. This meant that the students dutifully took out their 'neat' and started memorising the questions and answers in low, but audible tones. After a few minutes of this, the group leaders began asking one or more of the others in the group to close their notebooks and answer questions from memory. Many of the students did not do this with a great deal of energy or enthusiasm and several students had their own quiet interactions. Some students seem to memorise in earnest with a great deal of rocking back and forth as they spoke aloud the answers written in their 'neat'. This class also included four boys with some form of learning difficulties and these boys were largely excluded from the processes in the class, since no one expected them to be able to understand or answer questions.

In another instance, the teacher who taught social studies to VII standard mentioned that she was trying something different in her classroom. In this case, she said with some pride that she had asked the students to frame their own questions and answers for home work and come to class. When the researcher went into the class, a boy was reading out the questions that he had framed from the textbook lesson and for each question, he was also reading

out the answer. The questions were simple questions which could be directly answered using the information contained in the textbook lesson. The questions constructed were seen as a device to check the ability to reproduce the text from the book and not to check for conceptual understanding. The questions basically tested recall and not understanding.

Sarangapani (2003, p. 138) while describing teaching in a government school near Delhi refers to a very similar process – "In the Kasimpur school, the process of learning involved establishing what would be considered the 'right answer to a question' and then ensuring that it was memorised in exactly the same form." In the government schools observed in this study, the teacher did not seem to spend much effort at establishing the correct answer, but merely transmitted the correct answer to the students, in an efficient manner by giving 'notes'. Teachers seemed to be under a lot of time pressure and during discussions with the researcher, spoke about the necessity of "completing the lessons" within the time available. They said that towards the end of the term, they preferred to give 'notes' which the students could write down and memorise, even if the teacher was unable to teach the lesson to the class.

In the high schools, similar practices of revision by rote learning answers were in use. For the X standard, the stakes were high, for students as well as teachers. Perhaps more so for the teachers as their salary increments

depended on the overall passes obtained by their classes in the SSLC public examinations.

At GAH, in the last trimester of the year, teachers and students of X standard had to stay back an extra hour after school for coaching. This had been the practice in the previous year too and had been mandated by the state education department in a bid to increase the percentage of passes in the secondary school leaving examinations. Previously, teachers had been expected to group children according to ability and the students perceived to be "dull" were given this extra hour of coaching to help them prepare for the examinations. The results for the X standard in this school had been poor in the district- level preliminary examinations and the headmistress had decided that all the high school teachers needed to stay back an extra hour and coach the students, instead of taking it in turns according to their subjects. As Gayatri explained, the procedure followed for the extra classes was to give students a set of questions and answers that they had to first write out in the class, then memorise at home and finally write these answers once again from memory during the coaching period in a situation that was like a rehearsal for the SSLC examinations.

Private school

Revision was a regular feature of the classrooms in the private school and before every round of tests or examinations, teachers took one or two periods

to revise the lessons with the students. Teachers varied in the way they organised these periods, but invariably revision consisted of asking students questions which they were expected to answer according to the notes given. Attention was paid to the precise wording of the answers as this extract from a classroom transaction indicated:

PU.L.15. (English medium) During a VII standard biology revision lesson, Savitri was quizzing the students.
Savitri: Unicellular organism?
Four hands went up.
Girl in the last bench answered in chorus, in a complete sentence: "Unicellular organism is organism made of only one cell".
Savitri (nodded, mouthed very softly, "only one cell". Then asked another student): What is unicellular organism?
Girl: Unicellular organism is organism that is made up of only one cell.
Boy (in response to head nod in his direction by teacher): Unicellular organism is organism made up of only one cell.
Savitri: Unicellular organism is an organism that is made up of single (emphasis) cell.

Savitri's emphasis on the word "single" showed how teachers signalled to students the importance of recalling definitions accurately. Shantala, in the same school, quizzed the students on the lesson to be revised and directed her questions one by one to students according to the students' seating order. She started with the first boy on the left edge of the first row and first quizzed the set of boys before proceeding to the girls, starting from the last row. Boys and girls were seated in such a way that their benches were separated by an aisle in the middle. The extract below occurred at the start of a revision class:

PU.L.16. (English medium) Shantala: I will ask, if you can't answer, question will pass (pause). You cannot sit down till correct answer is told (pause), ok?
Shantala (to boy on first row, left extreme): What is a mixture?
Boy1 (softly, inaudible at first, then as Shantala prompted he completed the answer): ..are (pause) combination of ...
Shantala: (prompts) two or more...
Boy 1: Substances (pause) they may be in (pause)...
Shantala: (prompts) any proportion and (pause) (no response from student) the constituents retain (pause)...
Boy1: the original properties.
Shantala: (to next boy) What is compound?
Boy2: (indistinct)
Shantala: Next
As other boys spoke out the answer, Shantala said "ssh" and they stoped saying out the answer.
Boy3: Compound (pause). Two or more elements combine to form a compound.
Shantala: Is there a proportion? Compounds are made by chemical combination of two or more substances in definite ratio. It is mixed chemically.
Shantala (to Boy 2): Now you say.
Boy 2 (pause): Compound is (pause)...
Shantala (prompts): Two or...
Boy2: more elements combine (pause)...
Shantala (prompts): chemically (pause)...
Boy2: combine (pause)...
Boy 2 has to remain standing.
Shantala: Formula of sodium
Boy 4: N-A
Shantala (blinked her eyes with a very small downward movement of her head.
Boy 4 sat down.
Shantala: Formula of (pause)...
Some boys: Hydrogen miss...
Boy5: H two...
Shantala: Why? Why not H (pause)?
Boy5: It is H two because hydrogen is made up of two atoms.

The control over questioning was fairly tight in this class. A few students were allowed a role in deciding which formulae they would recall. The students

who excitedly said “hydrogen” were displaying their own familiarity with the text to be learnt, or “showing that one knows” (Sarangapani, 2003, p. 146). While describing revision lessons in the village school that she studied, Sarangapani classified revision lessons into two types, that she called “threat and punishment” and “interrogation” respectively.

The threat and punishment type of class was described as a class where a student was threatened with punishment or actually punished, for not being able to give the right answer. In this class, it may observed that the teacher meted out a mild form of punishment for the students by laying down the rule that if they did not answer a question they should remain standing. As the class proceeded, Shantala repeatedly offered opportunities to the students who were standing, to redeem themselves by answering another question.

The interrogation type of revision was used to detect students’ inability to answer questions and the teacher would try to find out which of the students did not know the answer. It could be said that Shantala’s class involved a mix of both types of revision classes. However, Sarangapani (2003, p.156) described a somewhat harsh style of teaching, where she described the teachers’ motive as wanting to *expose* (original emphasis) students’ lack of knowledge and lower their epistemic status. This motive could not be imputed to Shantala or the other teachers in this school. Shantala, seemed to be genuinely interested in helping the student arrive at the correct answer, as could be seen by the many verbal prompts that she provided. She also

conscientiously directed a second or third question at the students who were standing, at the earliest opportunity, in order to enable them to answer the question and sit down. Opportunities that were used for this arose when another student was unable to answer the specific question and the question could then be "passed". Alternatively, Shantala would direct a relatively simpler question, requiring a "yes" or "no" answer to the students who were standing. The students were not fearful of the teacher in this class. At the end of the lesson, when this researcher spoke to two students who had not been able to answer, they laughed and said that they had not learnt at home. When asked whether they were afraid of their teacher, they shook their heads and said that they would study hard the next time.

Shivraj, Savitri and Arati rarely used the interrogation style and their questions were directed to the class in general, and student response was voluntary. All teachers occasionally directed questions to particular students, and the reasons for these could be variously interpreted.

When asked about her reason for interrogation, Shantala said, *"This way I will come to know who are the students who have not understood and I can suggest them to read more at home."*

Understanding or knowing in the classroom was equated with the recall of 'right answers'. "Evaluative rules constitute any pedagogic practice. Any specific pedagogic practice is there for one purpose: to transmit *criteria.* Pedagogic practice is in fact, the level which produces a ruler of

consciousness" (Bernstein 2000, p.28). This ruling of consciousness seemed to be what Sarangapani (2003, p.161) was referring to when she said, "even their (children's) own knowledge or understanding acquired a recall form. Quizzing was also a popular activity wherein children created opportunities to reveal their *pehchaan,* by showing each other that they knew things that were regarded as valuable."

International school

There were no clearly discernible periods for revision allocated in Tara International school. The "recall of right answer" type of drill that was observed in the other schools was not observed in this school. Therefore, the evaluative criteria being transmitted were different. However, teachers seemed to embed recall questions within the instructional discourse that occurred in various modes – like teacher-led explanations type of lessons, discussion-based lessons or project lessons. An extract from the lesson taken for the VI standard on food groups, showed the teachers cuing students towards the right answer, "cellulose", in this particular instance.

PI.L.17. (English medium) Bindu: What do vegetables give us?
Boy 1: Starch
Bindu: Not starch.
Boy 2: Carbs.
Bindu (seemed not to catch what the boy had said): No, not starch.
Sheela: Can we give them a clue, Ms K?
Bindu: Remember, we studied about plant cells? What is the cell wall made of?

There was no response from the students.
Bindu: It is cellulose (emphasis), remember.

Presented below is another extract from a discussion class with standard X

when Maya and Mohan were co-teaching.

PI.L.10b. There was a brief conversation between students about methods of counting and the use of tranquilising guns on tigers. Maya responded to this discussion:
Maya: Last time, we talked about one person (pause).
Students (overlapping): Ul..; Bina Ullal….; Ulhas Karanth.
Maya: Do you find it difficult to remember these names?
Several hands went up in response to indicate that they do find it difficult to remember these names.
Maya: He is well-known, Dr. Ulhas Karanth and his father was also a famous Kannada writer, Shivarama Karanth. As people of Karnataka, we are proud of their achievements. Walk in to the IX C (IGCSE) section, you can see they have displayed a photo of Ulhas Karanth.
Maya: What method did he develop?
No response from students.
Maya: Camera trap. It is not wild life photography (explaining). Scientists use cameras equipped with infrared triggers. When an animal walks across the infrared beam sent out by the camera, it automatically takes a photograph.
Girl5: Isn't it a slow process?
Mohan: No. But the camera can be triggered by anything that cuts the beam, elephants often set off the camera. Even a fly can do it. For the tiger census, they identify individual tigers by the pattern of stripes. Ulhas Karanth's trap costs about one and half lakhs. One of my friends develops another camera trap using a Kodak camera. He is a local cable operator and just using native intelligence, he has developed this camera. It costs just around 500.

The extract below was taken from a biology lesson taught by Kaveri to

standard IX:

PI.L.18. (English medium) Kaveri: Multicellular is what? (pause)
Girl2: Multicellular means made up of many cells.
Kaveri: Multicellular allows cells to be (pause)... give me the word (pause) ...

Students made three or four attempts, their responses overlapped with each other. Someone said “specialised”.
Kaveri (immediately caught the appropriate word and repeated it): Specialised (emphasis). If you expect me to teach English, I (emphasis) will (emphasis) not (emphasis) do it (pause). Multicellular organisms can have specialised cells. Do they have brains? Do they have anus, mouth?
Chorus (very soft and hesitant): No.

In general it was possible to say that, in the international school, although recall of specific words or phrases (“right answers”) were expected from the students and teachers provided opportunities for this, the lessons themselves were not classified strongly into explanatory lessons, note-giving lessons or revision lessons. The teachers placed the recall type questions in the context of the lesson being transacted and the discourse was extended by further elaboration through the use of questions by students or the teachers.

In the government and private schools, the lessons were clearly demarcated into phases for introduction, note-giving and revision. This was not the case in the international school. Similarly, students were provided with answers to questions in the form of notes that they had to memorise in the first two types of schools, but not in the international school. In the government schools, teachers often taught by directly reading out and re-phrasing or translating sections from the textbook. This was not the case in the private school and the international school. Thus, diifferences existed in the official recontextualisation fields in the different types of schools. However, similarities in terms of the pedagogic/unofficial recontextualisation fields were seen in the classroom practices prevalent in the different schools. The pacing

of instruction in all the schools was controlled by the teacher and was determined by the imperative to complete a fixed number of lessons in a given period of time. Secondly, questions within the classroom were predominantly asked by the teacher and not students in all the schools. The third similarity was the use of the textbooks as the primary resource for instruction, forming what has been termed the textbook culture (Kumar 1988).

5.3 USE OF TEXTBOOKS

Krishna Kumar's description of 'text-book culture' (1988) described the dominant role played by the textbook in the school classrooms. Schooling is structured around the study of the prescribed textbooks and examinations conducted on their basis.

> "The term 'textbook culture' signifies not only this control on 'products of learning' but also includes the regulating effect of textbooks on what transpires within the classroom between teachers and pupils and on the process of learning itself. The words 'control' and 'regulate' seem to suggest an external top-down imposition or coercions" (Sarangapani, 2003: p.124).

On the other hand, Clarke (2001, p. 102) spoke about the teachers' acceptance of the textbook as important in instruction and wrote that the primacy of the

textbook was unambiguous for teachers. Both Clarke and Kumar seem to imply that the official pedagogic discourse as articulated through the textbooks was the only discourse.

However, in her own work Sarangapani (2003) showed that regulation and control also occur independently of the official recontextualising field as constituted by the textbook and examinations. Regulation and control could also occur from inside by "becoming a part of the ideational framework from which teachers and children derive and interpret their classroom activities in the form of beliefs about knowledge, knowing what knowledge is worth knowing, and the image of the 'educated man' (ibid, p.124).

Describing the textbook culture, Kumar (1988) distinguished between two types of educations systems on the basis of interests that controlled the production of textbooks. In the first type of system, found in countries where corporate interests were involved in the textbook business, schools were free to choose textbooks from a list recommended by the state officials. The teachers were trained to create their curricular plans and free to select textbooks they considered appropriate. The second type of education was found in countries where the state had overwhelming or even monopoly rights to publish school textbooks.

> "The second type of education system ties the teacher to the prescribed textbook. She is given no choice in the organisation of curriculum,

> pacing, and the mode of final assessment. Textbooks are prescribed for each subject, and the teacher is expected to elucidate the text, lesson by lesson in the given order. She must ensure that children are able to write answers to questions based on any lesson in the textbook without seeing the text, for this is what they will have to do in the examination when they face one" (Kumar, 1988: p 452).

As a result of this type of pedagogic practice, teachers primarily taught in order that students would be able to write the expected answers to questions based on the lessons in the textbook. The teachers transacted the lessons in such a way that even while they were elucidating the lesson, they verbally emphasised the key information that the students would be expected to remember. The verbal emphasis was further reinforced by catechism-like questioning wherein the students chorused this information in response to the teacher's questions. More or less similar questions were then written down on the board and answers to these may also be written down on the board for the students to copy into their notebooks. On some occasions, answers to the questions may be dictated for the students to take down.

With the exception of some classrooms in the international school, in all the other classrooms that were observed, the lessons were structured around the study of the prescribed textbooks and geared towards the tests and examinations that formed an integral part of the curriculum. However, it was

interesting to note that though textbooks could be said to determine the content of what is being taught, they do not seem to have much impact on the mode of transaction of the lesson itself. Teachers treated textual information as something that they needed to read out and 'explained' to the students and did not seem to consider students' capable of independently working with the textbooks.

As already described, in most of the classroom interactions observed during this study, the teaching of content was structured into phases. The first phase consisted of an explanatory or expository phase when the teacher explained the topic, allowed a few questions from the students and occasionally gave examples related to the content of the lesson. Sometimes, these examples were those mentioned in the textbook and sometimes, teachers provided examples not mentioned in the textbook and on a few occasions, students were allowed to offer examples from their own experiences. However, in all the classrooms, the main objective of the lesson was to transmit the content of the lessons as presented in the textbook. A predominant goal of all the teachers was to finish "portions" of the prescribed syllabus and therefore, they would often curtail this phase of the lesson in order to allow for the other two phases of the lesson, namely note-giving and revision. The goal of finishing a fixed number of lessons in a given time frame constrained the instructional style and methods used by the teachers.

5.3.1 READING AND PARAPHRASING FROM THE TEXTBOOK

Teachers in government schools often followed an instructional style that consisted of reading out sections from the textbook and then translating, re-phrasing or paraphrasing what was read. . The paraphrasing of the text was followed by asking questions so that the same content was repeated by the students in chorus. Potentially, any text could be treated in this manner and Shanta and Vijaya explicitly said that there was no significant difference in the way they taught science or other subjects, although during discussions, Shanta and the social studies teacher, Selvimani, did express that there was a difference in the content of these subjects. Science dealt with phenomena that could be observed in the present whereas history dealt with the past. The extract below from the beginning of a mathematics lesson for standard IX taught by Savitri at GAH, indicated that even a mathematics lesson followed the same instructional strategy.

GAH.L.19. (Kannada medium) Sharada (Loud tone): *Hey, quiet. What had we done last time – had we covered this* (pause)?
Sharada read rapidly from the text book.
Sharada: *How do we find the square roots of 1 digit number? First write the number like this – it is shown in your textbook*
She wrote $\overline{)7}$ on the blackboard
Students: *First find the nearest perfect square less than the number.*
Sharada: *It is...*
Students: *It is 4. First we will write two, then we have to write 4 under seven and subtract it.*
Sharada: (as she wrote on the board) *We get...*
Students: *3. We must put point and write two zeroes and bring down the zeroes.*
Sharada: *Yes, then we double the 2 and write 4 here* (wrote on the blackboard)

The class then proceeded as the first worked out example from the textbook was written out on the board by Sharada with the students verbalizing the steps. Since these steps had already been covered, Sharada then proceeded to show the steps for calculating the square root of a two digit number and then a three digit number. After writing out two more examples on the board she told the students to copy the examples from their textbooks. The examples on the board were the same as those in the textbook.

5.3.2 CONTROLLING STUDENTS' USE OF TEXTBOOKS

Clarke (2001: p 56) wrote "… teachers accept it (the textbook) without conflict as the basic and, possibly only tool for instruction." Further, teachers explicitly managed the ways in which students used their textbooks within the classroom. This tendency to direct students' use of textbooks to cut across school types. Teachers from the government schools, the private school, as well as teachers in the international school gave explicit instructions for use of textbook within the class room.

All teachers preferred to control the flow of information and did not expect students to read the textbooks and process information for themselves. In the case of the government high school classrooms where teachers had the students read out from the textbook, they invariably paraphrased the text. The implicit belief here was that, as teachers, their role was to mediate between the textbook and the student.

In the case of Kaveri, who taught biology at the international school, PI, the way the students processed information from the textbook was controlled by her in the classroom. Although she did not have students read

aloud from the textbook, she explicitly directed the use of the textbook. So also Maya from the same school. It needs to be mentioned that on several occasions, teachers at this school did not use the textbook at all while teaching. Teaching involved varied strategies such as project work, discussions and mind-mapping. However, in cases where the textbook was used during the teaching, teachers preferred to direct the use of it by students in a very explicit manner.

The following extract showed how Kaveri, while teaching Biology to the IX standard, attempted to regulate precisely what a student must be doing while using the text book.

PI.L.20a. (English medium) Kaveri (suddenly switching to soft voice, still clearly audible): Will you open to page 93 please? Will someone find hydra for me please?
Boy1 (standing up): (indistinct)
Kaveri: Your pen has run out of ink, shall I write with my pen in your book? Go and get another pen. (To another boy) Don't think of last year, not next year (emphasis). Look at hydra (points to hydra in his textbook).
Kaveri: Have you all found hydra? Find four external features of hydra.
Three hands went up.
Kaveri: Have I finished? Put your hands down. Raghav, you are reading, I know what you are doing, you are reading – if you lift sentences from the book I will get angry, I have read the book. I want you to look at the diagram and relate what you learnt about protista. (pause) Suchitra tell me.
Girl1: Multicellular, tentacles...
Kaveri wrote on the board.

Multicellular
Tentacles

Bo2: Are they sexual?
Kaveri: Can you see sexual organs? (Boy2 pointed something out in his textbook as Kaveri stood by his desk) Are they testes? Aakash can see testes (pause). No, these are the simplest multicellular organisms, why do you want

them to fall in love like you. (pause). What Aakash thinks as sexual organs are not testes, they are baby hydras.

In the extract presented above, Kaveri was explicitly directing what the students were to do with the textbook in the class. She wanted them to look at the diagram of the organism, "hydra" in the textbook and notice its morphological features. She did not want students to read the descriptions of these features given in the textbook. She told students that she would be able to know whether they were reading from the textbook by their use of sentences that were identical to those given in the textbook. She claimed to know precisely what was written in the textbook and thus identify sentences that were 'lifted' from the textbook by a student answering her questions. When a student mis-identified a cylindrical projection from the side of the "hydra" figure as "testes"; she corrected the student using sarcasm. She did not try to get the student to discuss further on why the projection could not have been the testes of hydra, nor did she point out features which could have helped the student understand what the cylindrical projection was. Kaveri spoke aloud to the whole class saying that the projections were "baby hydras". She was asserting her position as the epistemic authority in the class by controlling the information available to the students in her class and forbidding them to read the textbook, even though they had it open.

The extract below was from a lesson taken by Maya at the international school, PI. Even here, it was possible to notice the teacher controlling students' use of the textbook.

PI.L.21. (English medium) Maya was teaching Biology for IX standard in the lab and there were nine students present in the class. After initial interaction based on a clipping that the students had watched on a single computer, the students had moved to the benches as instructed by their teacher.
Maya: Now move to your books.
Maya: On Monday we did Bio, right? You are drawing the steps of mitosis (pause). Fold your book like this (holds up the text book to show how).
Girl1 (overlapping talk by others) asks for some clarification regarding the drawing.
No definite response from Maya.
Maya: I want the steps, in interphase, I want the description of what happens, then anaphase, metaphase, telophase (pause). You have seen the interphase in the onion cell (pause). I want the steps. No chatting. Dipankar sit here!
Maya moved around the benches, where the students had seated themselves in order to draw. There was a lot of space in the lab, but the students more or less clustered around one of the work tables. They had their books open on the same page. Maya ordered the students to sit apart and directed students to places where they may sit. She also instructed them not to turn the page.
Maya: You have 20 minutes, I will take the papers at 9:20. (pause) Draw a schematic diagram.
Boy2: Plant cell or animal cell?
There is a 30-second interaction between Maya and the boy that was not audible to the researcher.
Maya: What did we see today?
Boy2: Broad bean cells.
Maya: What are broad bean cells called here?
Boy2: (indistinct)
After about 2 minutes, as students proceeded with the task assigned, Maya addressed the class.
Maya: Whether you do your work or not, I will take away the papers.
Maya: (to second boy) You are not to turn the pages. (Generally to class) You need pencils, erasers.

Maya shared with the researcher that the main objective of this lesson was to help the students practice drawing and correctly label the different stages of cell division. This would help the students later as they would be required to do this during the examinations. She wanted the students to correctly identify the stages of cell division from the diagram, without looking at the information given in the textbook and had therefore instructed the students to fold the book in such a manner as to allow them to see and copy the diagrams, but not read the information presented in the textbook.

In PU, the private school, the students seemed to be well-versed in when and how the textbook was to be used. The class leaders invariably kept track of the exact point where the previous class had left off, or of the number of questions and answers the teacher had dictated. Except in the case of Arati, the other teachers did not have to explicitly direct the students in the use of the textbook during the classroom. They expected students not to open the books during the introductory/explanatory phase of the lesson and clearly indicated when students were to copy down questions from the textbook. Answers to the questions were invariably written on the board for the students to copy down and did not require students to use the textbook. Arati told the researcher that she did not like to write answers on the board, and was therefore an exception in this regard.

In the government schools where classes were observed, there was less explicit regulation of students' use of textbook in comparison with the other

schools. Teachers started the lesson directly by reading out from the textbook or asked students to read out while they re-phrased and emphasised relevant portions of the textbook. They also controlled the pace of reading by asking the student who was reading aloud to stop at certain points. Vimala (GAH) defended her strategy of making students read aloud from the textbook in class by saying that many of the high school students worked after school and did not get time or opportunity to read the textbook outside the school.

At the private school, students in standards VII, VIII and IX were very conversant with the textbook-based teaching and knew without explicit instruction that during the elucidation phase of the lesson, they were not expected to take out their textbooks or notebooks. Teachers had well-established classroom routines for the phases of the lessons and students were clear that they were expected not to refer to their textbooks during the explanatory phase of the lesson unless explicitly told to do so by the teacher. However, Arati who taught Biology to IX standard had a teaching style that often consisted a mix of explanation and note-giving and the extract below indicated how she controlled students' usage of their textbooks in the classroom. Arati referred to the textbook as 'reader'.

PU.L.22. (English medium)
Arati: Describe Watson and Crick's, describe Watson and Crick's, describe Watson and Crick's model of DNA fullstop. [she was dictating…]
Student (low voice): Spelling of Crick miss?
Arati (impatient tone): If you have doubts, refer your reader. Answer. The American scientist James Watson and the English scientist Francis Crick –

refer your book for spellings – explained the structure of DNA in 1953. The American scientist James Watson and the English scientist Francis Crick explained the structure of DNA in 1953 . They were awarded the Nobel prize. Have you got the line?
Students (chorus): Yes miss.
Arati: They proposed a model to describe the structure. They proposed a model to describe the structure. It is called Watson Crick model or double helix model.
The note-giving was interrupted for about two minutes at this point when a girl stood up to say that her friend was ill and Arati allowed the sick girl to be escorted out of the classroom by her friend.
Arati: Structure of DNA model resembles a twisted ladder.
Arati went to the board and drew a diagram of the two twisting strands of the DNA helix. Then turned again to face the class and explained briefly.
Arati: Twisted ladder. Have you seen ladder? Twist it (gestured with hands). Twisted ladder. full stop. This ladder-like structure is called double helix full stop. This is one strand (holds up finger on right hand), this is another strand (holds up corresponding finger on the left hand). The two strands are built of nucleotides (repeats). Underline nucleotide.
Some students audibly open their pencil cases to retrieve pencils.
Arati: Underline with whatever you have, don't open your boxes and disturb the class. A single nucleotide consists of a deoxyribose sugar, a phosphate unit and a nitrogen base. Refer your book for spelling. You are not small children for asking spelling and I don't want any spelling mistakes.
Arati interrupted the note-giving by chastising a student for using an extra thick pen, and then taking the pen away from the student.
Arati: A single nucleotide consists of a deoxyribose sugar, a phosphate unit and a nitrogen base. There are four nitrogen bases. Deoxyribose is a pentose sugar full stop. The nitrogen bases connect the two opposite strands like the rungs of a ladder full stop. Change the paragraph.
Arati muttered indistinctly as she read the book. Then looked up at the class again
Arati: OK, that is enough, I don't want to give a long answer.
She again muttered below her breath and read the textbook and flipped the pages of the textbook.
Arati: Is this question in your book?
Two boys: Which one?
Arati: What is the difference...
Students (chorus): Yes miss.
Arati: Copy the question. The changes that take place during karyokinesis are in four stages. My book and your book are different. Refer spellings page 26. (Reading from the book) The changes that take place during karyokinesis are in four stages namely, prophase, metaphase, anaphase and telophase full stop. It is followed by division of cytoplasm. It is followed by division of cytoplasm

full stop. This phase is called cytokinesis full stop. See there is a question, what is DNA replication? What is the significance? Have you got the question?
One or two students: Yes miss.
Students flipped pages of their textbooks and there were whispered exchanges between them and then they managed to locate the question.
Arati then proceeded to dictate the answer from the textbook.

Arati was giving notes in the form of questions and answers that she was dictating to the students to take down. She explained to the researcher that she had no time to prepare a set of question and answers beforehand like the other teachers because she had been made responsible for coordinating various extra-curricular activities in the school. She also said that she did not like to confine herself only to the textbook while framing questions. However, in the lesson described above, Arati expected the students to look up spellings from the textbook, but did not allow them to frame answers by reading the information from the textbook. She said that she did not want students to "*simply copy*" from the textbook. She too was directing the students' use of textbooks, while instructing students to refer to their books for spellings, she was providing the answers to the questions. Like Kaveri (PI), she did not want students to copy sentences from the textbook. However, while Kaveri was asking students to respond to her questions without taking recourse to the information presented in the textbook, Arati was dictating what the students' response to a textbook question should be. It must be noted that in Kaveri's class the textbook was used as part of the explanatory phase of the lesson, and that in Arati's class, it was used during the note-giving phase of the lesson.

5.3.3 VARIATIONS IN USE OF TEXTBOOKS DEPENDING ON SUBJECT TAUGHT

Observations in government schools showed that the way the teachers used the textbooks varied depended on the subject that they were teaching. The following extracts illustrate this variation.

In Shanta's (GAP) classrooms, the students were not expected to actually read out sections of the textbook during the science classes. Shanta considered it to be her role to read out sections from the textbook and paraphrase them if needed or use the teachering device to ensure that students were clued in to the appropriate answers to the questions from the lesson. The social studies periods taught to the same class by another teacher also did not involve the actual reading aloud of sections from the textbook. Even while reading the newspaper in a Kannada class, Vijaya used a similar teachering device to transact the text from the newspaper that she was intent on transmitting to the students.

However, when Shanta was teaching a language class, her use of the textbook in the classroom was different. Shanta taught Kannada to standard VI and proceeded in a manner quite distinct from the transactional style she used while teaching science.

GAP.L.23. (Kannada medium) While teaching a lesson about the environment from the Kannada textbook to a combined class of standards VI A and VI B, Shanta read out phrase by phrase from the textbook. After reading each phrase, she would pause while the children, seated on the floor, textbooks

opened in front of them would repeat in synchrony the phrase just read. Several children followed the text by moving their fingers over the text that was being read. Shanta's voice was gentle and her reading had a sing-song intonation and rhythm. The content of the lesson was not discussed while the reading was in progress. After reading of the lesson, in the manner just described, Shanta had a girl student leader read out a list of words from a notebook. Other students underlined these words in their textbook. The next phase in the lesson involved writing of questions and answers, and finally the rote memorisation of these.

What was also interesting was that on being probed about the content of the lesson with the question 'Was the lesson about Parisara?' Shanta initially looked puzzled and then on hearing the question again, replied, 'No, it is a Kannada lesson." Shanta's tacit understanding was that science needed explanation and this was to be done by paraphrasing the textbook content, whereas in the teaching of language, the content of the lesson was not important and the teacher's role was to make the students read aloud the text from the book.

In a somewhat analogous manner, the way in which a teacher, Shivanna at the girls' high school taught science differed from the way in which he taught English. In one of his science classrooms that was recorded, he had taken the girls to the projection room and used an overhead projector to project a coloured diagram of an animal cell and then proceeded to elucidate the names and functions of various cell organelles, using the 'teachering device' of cued questions and answers, as the following extract from the classroom transaction shows:

GBG.L.24. (English medium) Shivanna drew the nucleus and chromatin on the blackboard and named the various parts in English followed by Kannada. On the board, he labeled the diagram in English and using brackets also wrote out the Kannada terms beside the English terms. He then proceeded to explain about chromatin.
Shivanna: Chromatin is made of DNA and protein (emphasis) (pause). Chromatin is made of (pause)...?
Chorus: DNA and protein.

It may be noted that Shivanna did not actually use the textbook to read out from or paraphrase information from, during this classroom transaction. Subsequent observations and interactions revealed that the overhead projector was a teaching strategy reserved for inspections and special visitors, and was not used on a regular basis.

However, when Shivanna taught English, he used a different style. Shivanna had been given the additional responsibility of teaching English to the secondary school classes as the post had fallen vacant and no teacher had yet arrived to fill the post. Shivanna began the lesson by reading out the poem with a few pauses where students filled in the word. Students followed the text with their fingers on the appropriate line. After the poem was read twice, Shivanna gave Kannada equivalents to the words listed at the end of the lesson in the form of a glossary. After this, several students were made to read out the poem one after the other. This happened a total of eight times. After this, the questions at the end of the lesson were read out and mainly answered by Shivanna, although one or two students did respond. Finally, everyone had to copy out the poem in their notebooks.

In the case of both Shanta and Shivanna, it could be seen that the same teacher used different ways of transacting the lesson when they taught different subjects. This implied a tacit understanding that different subjects had different curricular goals. In the case of science or social studies, the teachers concentrated on explaining the content of the lesson whereas in the case of the language lesson, the focus was on the actual reading out of the lesson. In the case of Shanta's lesson from the Kannada textbook, it appeared as if the content of the lesson was of little relevance in a language lesson. In the case of Shivanna's English lesson, there was an attempt to help students understand the vocabulary to a small extent, but again the main focus was on reading out the lesson. Shivanna's lesson had the additional difficulty of teaching a class where several students were unfamiliar with spoken English and some of the students were not able to even read or write the language. The government girls' high school, GBG, was an English medium school and the section where this lesson was taught was an English medium section and the textbook was written with the expectation that student would have reached a certain degree of proficiency in the language.

A tacit assumption that seemed to underlie the differing transaction styles used by these two teachers for teaching science and languages was that in the case of science, the students did not need to read the matter presented in the textbooks and it was enough if they memorised the questions and answers given in the form of notes by the teacher. Broadly, this assumption could be

said to underlie many of the classroom transactions in the schools studied for this research. If in a science class a student was asked to read aloud from the textbook, it was a single student who did this and the main task of the other students was to listen to the teachers' paraphrasing of the text and respond to the questions. In contrast, in language classes, all the students in the class took turns reading out the lesson.

5.3.4 Extension of the Textbook Culture as a Pedagogical Method

While Kumar (1988) talked about the historical reasons for the evolution of the textbook culture, it appeared that this culture had led to the development of a pedagogical style that extended beyond the prescribed textbook. In the following transaction, the teacher, Vijaya had brought newspapers into the classroom and used them to talk about the historical and political milestones of Karnataka state, with class VII A at the government primary school. The subject being taught was Kannada and towards the end of the period, Vijaya linked the newspaper information to the lesson about letter writing in the prescribed textbook. The teacher used the same pedagogical style for teaching the information from the newspapers as she would for elucidating a textbook lesson in science or social studies.

GAP.L.25. (Kannada medium)
Vijaya: *You people don't buy newspapers and don't read them, so I am showing these to you. At least you can know about our own state. Is that important?*
Students (chorus): *Yes miss.*
Vijaya then showed pictures in the newspapers of ancient inscriptions.
Vijaya: *Ours is a great language. Our Kannada bhasha is a great language. How is our Kannada bhasha?*
Students (chorus): *Great language.*
Vijaya (holding up the picture): *Can you see the picture?*
Students (automatic response): *Yes miss.*
Some students towards the periphery were craning their heads to see, while some others were plainly indifferent to what was being shown.
Vijaya: *Can you all see?*
Students (chorus): *Yes.*
She held up caricatures of the past chief-ministers of the state, all 18 of them.
Vijaya: *Who is the first CM?*
A few students: Jawaharlal Nehru.
Vijaya: *That is the first prime minister, not the chief minister. Our first chief minister is K.C. Reddy. Who was the first chief minister?*
Student (chorus): K.C. Reddy.
After moving swiftly down the list of chief ministers, Vijaya proceeded to read about the Vidhana Soudha from the newspaper.
Vijaya: *Kengal Hanumanthiah was the architect of Vidhana Soudha. He built it with the help of inmates from the central jail. He built it with the help of* (pause) *inmates from the central jail* (emphasis). *Who was the architect of Vidhana Soudha?*
Student (chorus): Kengal Hanumanthiah.
Vijaya: *He built it with the help of...?*
Student (chorus): *Inmates from the central jail.*

Having done with the papers, Vijaya folded them and put them away and made the links to the lesson in the Kannada textbook. The lesson was in the form of a letter from a sister to her younger brother describing her visit to a famous place in the state. This episode indicated how the 'teachering device' was used by Vijaya to recontextualise non-textbook information from the

newspapers for presentation to her students. The process used was similar to that used for presenting textbook information in the class.

Describing some of the features of the textbook culture, Kumar (1988) wrote : "As far as the structuring of knowledge is concerned, the system offers a rather limited space within which the school teacher must move. Over the pacing and ordering of knowledge, and over its associations with certain texts, the teacher has very little autonomy. Textbooks hold a central place in the system." While acknowledging this, the present study has tried to show that all the teachers controlled the flow of information from the textbook to the student, during the classroom transactions. The way Vijaya used non-textbook material in the class indicated that the method used for textbooks has been extended to the presentation of other material as well. The text was never handed over to the students to read at their own pace, and the information was selected and presented by the teacher in the familiar form. Even when students were in physical possession of the textbooks, the teachers more or less sought to control how the students should interact with textbook and at what pace and at what time.

The pedagogical method used to transact the lessons in a textbook in this case could be said to have extended to other texts as well. Adherence to this method probably explained the teachers' dependence on textbook and also the confidence that she had of being able to transact lessons from any given

textbook. Teachers seem to need little else apart from the textbook in order to teach a subject.

Given teachers' dependence on textbooks, educational reforms have attempted to change pedagogy by changing the textbooks and thus continue exerting epistemic authority over the teacher through the textbook. However, this epistemic authority is undermined or subverted by the teacher in practice, since she could treat all texts in the same way, and thus control the transmission of information, the pace at which it was transmitted and also the criteria by which students' acquisition of this knowledge was to be assessed. This relative autonomy was in tension with the official recontextualisation field that imposed a fixed set of textbook lessons and also the evaluative criteria in the form of examinations.

In this chapter, it was noted how teachers in the government school interceded between the textbook and the students by determining which sections of the textbook were to be read aloud and the pace at which these were to be read. Teachers also invariably re-phrased or paraphrased the text. Implicit in this pedagogy was a notion of the learner as needing guidance in reading and interpreting the textbook. One teacher specifically mentioned that she made the students read the textbook in the classroom as otherwise they would not read it on their own. While giving notes, teachers in government and private schools made the students write down answers to questions. These answers were formulated by the teachers and the students were expected to

memorise the answers. The official recontextualising field had determined the form and content of knowledge that was to be taught, whereas the pedagogic recontextualisation was done by the teachers who controlled how the official knowledge was to be read and interpreted. The evaluative rules of the pedagogic device in the form of examinations constructed the pedagogic practice by providing the criteria to be transmitted and acquired (Bernstein 2000). Teachers in all the schools used the teachering device to convey to students what was important to remember. In the international school, the students were expected to show that they had acquired the content by being able to talk about it in the classroom and write it in the form of answers to questions asked during the examination. In the other schools, the students were expected to show that they had acquired the content by writing answers to questions in the same form that the teachers had made the students write during note-giving. The notion of what counted as knowledge to be taught was contained in the textbook. The role of the teacher was to help students acquire this knowledge and also to transmit the criteria for evaluation. By directing students' attention to a specific part of the textbook as in the cases of Kaveri and Maya, or by deciding how they should use the textbook while writing notes, as in the case of Arati, the teachers were mediating between the textbook and the student and selecting which parts were of the textbook were to be learnt and which parts ignored. The teachers were, therefore, able to

exercise a degree of autonomy in the classroom and were not merely relaying unchanged the knowledge presented in the textbooks.

This research study, thus, indicates how the pedagogic recontextualisation field has an effect on the pedagogic discourse within the classroom and points to the agency of teachers.

Mead once proposed a contrast between "learning cultures" and "teaching cultures" (Mead 1942, as noted in Gearing 1973). A "learning culture" refers to a small, homogeneous group that shows little concern for transmitting culture because there is virtually no danger of anyone going astray. "Teaching culture" refers to societies that regard it as imperative that those who know inform and direct those who do not know. In India, the 'teaching culture' has a long history in the form of the '*guru-sishya*' tradition. This tradition can be traced back to the Vedic times. Here the teacher is cast as a *guru* – a religious, spiritual knower/teacher (Sarangapani, 2003, p.112).

However, according to Krishna Kumar, the origins of the 'textbook-based teaching culture' in the Indian educational system can be traced back to the nineteenth century, in the historical circumstances under which India's present education system developed. The East India Company took certain definite steps for establishing an education system. The new system acquired a final, bureaucratic format in 1854 from Sir Charles Wood's dispatch. Among the major decisions taken by the colonial administrators during this period, the following are relevant to this discussion : (i) the new system would be

governed by a bureaucracy at every stage from primary schooling onward and in all aspects, including the structure of syllabi, the content of textbooks, and teachers' training; (ii) the new system would aim at acculturating Indian children and youths in European attitudes and perceptions and at imparting to them the skills required for working in colonial administration, particularly at its middle and lower rungs; (iii) the teaching of English and its use as a medium of instruction would be a means of this acculturation and training; (iv) indigenous schools would have to conform to the syllabus and textbooks prescribed by the colonial government if they wanted to seek the government's aid; (v) impersonal, centralised examinations would be used to assess students' eligibility for promotion (Kumar, 1988).

The textbook culture can be said to be a re-casting of the already prevalent teaching culture, where the colonial rulers took on the mantle of those who know and set to 'teach' those who do not know, namely the subjects of the colonial state. The epistemic authority of the teacher was eroded in this process, and from being an authority unto himself, the teacher became a transmitter of knowledge that was determined by the state as being worthy of transmission. The textbook came to represent the authoritative version of the official knowledge that was to be transmitted as accurately as possible. The criterion for acquisition of this knowledge was the ability to reproduce this knowledge, verbally in response to the teachers' question in the classroom and then in the form writing during examinations. The aspect that

remains to be explained is the persistence of this 'teaching culture' in our schools, but this is beyond the scope of the present discussion.

5.3.5 TEACHERS' EXPLICIT JUSTIFICATION FOR USE OF TEXTBOOKS

In the government primary schools, teachers did not seek to justify the use of the textbook and attempts to probe the rationale for use of textbooks during classroom teaching did not elicit significant responses and was often greeted with a puzzled look or silence.

At government high school GAH, Vimala justified the use of textbooks in class, thus:

> "I know in science we are not supposed to read the textbook in the class, but I ask them to read. They will not have the time or inclination to read once they are at home, no one to care. May be they even have to go for work. So I ask them to read aloud for a bit. We cannot use what we learnt in B.Ed. Here, heavy strength. I adapt to the situation."

When probed about controlling students' textbook use, teachers justified using such strategies by giving varied explanations. In the private schools, teachers said things like,

> "if we allow them to read while we are explaining, they will not pay attention", "some of them think they are too smart and will keep disturbing with questions", "they will not understand and confuse the

> others with their questions"; "I never allow them to take out their books when I am explaining"; "when we are telling they must listen", "they will catch some small mistake and waste time".

It was interesting to note the variance in the responses given by teachers in the private school and the responses (much fewer) given by teachers in the government schools. The teachers in the private school seemed to have acknowledged students' ability to read and process information from the textbook and sought to control their use of the text book in order to maintain their own epistemic authority in the classroom. The teachers in the government school, on the other hand, implied that their students rarely read the textbook on their own and had to be provided with opportunities to do so in the classroom. They also thought it necessary to explain or paraphrase the text from the book, indicating an assumption of the students' inability make sense of the text without teachers' mediation.

5.4 USE OF QUESTIONS BY TEACHERS

Questions are a normal feature of all the classrooms and as has been already mentioned, may serve a variety of purposes. Carlsen (1991) in his review of questioning in the classroom described discourse in the classrooms as a type of language game in which there were four possible moves: structuring, soliciting, responding, and reacting. Teachers use voice, tone and gaze along with explicit direction to manage student behaviour and action in class. In

addition to these, teachers extensively use questions for various purposes in the classroom. Teacher's questions are the dominant form of verbal interaction in the classroom. Teacher – interrogation takes place during the introduction and during and after the explanation in order to recapitulate points explained. Teachers also articulated that questioning helped them to evaluate whether *'students have learnt'.* Revision for tests consisted of verbally asking students questions from the 'notes'.

In this study, teachers' questions in the classroom were classified based on the context and purpose. Kaveri from the international school mentioned that asking questions from the students helped her to know whether they were *'getting it'*. She also used questions as a way of ensuring that students were attentive to what was being taught and at times used questions to prove to students that they had to learn the lesson and could not afford to take it easy or "*goof off"* as she put it. The following extract is taken from a lesson transacted by Kaveri.

PI.L.20b. (English medium)
Kaveri (very loud): Did I ask you to do that? (pause) You enjoy the noise (sarcastic smile). Now ... (pause) (in ordinary, but not conversational voice), we have done amoeba of protista. I want some characteristic of protista.
Seven students, both boys and girls, raise their hands.
Kaveri (to boy): Aakash
Boy1 (Aakash) (he is seated and the textbook is open on the desk): (indistinct)
Kaveri: You are reading from the book (raising voice and slowing rate of articulation). Do not read from the book.
Boy2: They are unicellular.
Kaveri: Unicellular means? (pause)

A few students, both boys and girls, attempt to articulate, but their attempts are not accepted by Kaveri.
Girl1: They have a distinct nucleus (answering the question about characteristics of protista and not the sub question about unicellular).
Kaveri: Very good, a distinct nucleus (emphasis) and? (pause).
Boy2: (indistinct) double membrane.
Kaveri: Don't give me double triple and all that. Say nucleus is surrounded by a nuclear membrane.
Kaveri: Amoeba takes in water all the time. How?
Boy 1: Osmoregulation.
Kaveri (loud, slower articulation): Don't (emphasis) flash (emphasis) words (emphasis) at (emphasis) me.
Kaveri: Amoeba takes in water (pause). How?
Three hands were raised.
Kaveri: Who can answer?
Boy2: Osmoregulation.
Kaveri: This is why you don't do well in the test (mimicking/mocking voice). I like biology, it is easy, I don't know why I don't do well in the test. (pause) (loud, slower articulation) Because you have not answered or understood the question (pause) I asked how amoeba takes in water and you name a process. Now, how does amoeba take in water? (to girl) Suchitra?

Teachers' questions can serve a number of purposes as the above extract indicated. The section on general teaching strategies presented examples of questions that could be said to be part of the regulative discourse in the classroom. These questions were used to direct student action in the classroom.

For the purposes of the present analysis, they could be classified into questions that are part of the regulative discourse of the classroom. The regulative discourse is the embedding discourse and produces order in the instructional discourse (Bernstein, 2000: p. 34).

The purposes for which the questions were used could be classified as below:

Regulative discourse.

Getting the students attention;

As a way of maintaining students' attention;

To monitor students' task completion.

Instructional discourse

To check at which point the teaching has to be resumed;

To establish the context of the lesson to be taught;

To emphasise key ideas/concepts/information to be memorised;

To elicit the expected 'correct answer'.

5.4.1 Questions that Formed Part of the Regulative Discourse in the Classroom

Getting the students' attention

In order to get the students' attention at the beginning of the period, teachers used questions like:

> *'Why are you still talking?"; "Don't you want attendance?"* (Gayatri, GAH)
>
> 'It is 10:45, can you read the time?" (Kaveri, PI)
>
> 'Mr. Verma, you appear confused about where to sit. Each time, the same issue is coming up. Not ready to start class? Shall I talk to your class teacher? (Sheela, PI)

‘Can we start?’ (Mohan, PI)

Except for Gayatri (GAH), the teachers in the government schools generally did not need to specifically get the students’ attention as there was a tacit understanding about expected behaviour once the teacher entered the class. Whenever a teacher or other authority figure, including the researcher, entered the class the students chorused out a greeting. The greeting invariably signalled to the students that they needed to stop talking among themselves and await instructions.

At the private school, PU, none of the teachers, Shivraj, Arati, Shantala, Savitri used questions to gain the students’ attention at the beginning of the class. As soon as the teacher entered the class, sometimes even as another lesson was in progress, the students stood up from their benches and chorused a greeting, and would sit down silently when the teacher asked them to do so. However, for two of the recorded lessons, Shivraj had to raise his voice and command the students to settle down before he could start the lesson. On both these occasions, there were school-wide extracurricular activities in progress, making the students quite excited, and were therefore exceptions to the general norm.

By the time students’ entered the higher classes at the government schools and at the private unaided school, they had got thoroughly socialised into the expected patterns of classroom conduct. Teachers did not have to

make an effort to get their attention at the start of each lesson as it was automatic for students to be ready for the teachers' instruction. If, on some occasions, students were distracted or excited and failed to assume the silent stance as the teacher entered the classroom, they were chastised and very quickly brought to order. Teachers in the government schools and the private school did not have to overtly signal to the students that the lesson is about to begin.

At the international school, however, students did not stop talking as a matter of routine when the teacher entered and teachers had to deliberately signal the start of the teaching interaction. The teachers invariably had to ask the students if they were ready for the lesson. It must be mentioned that 'asking' here did not mean that the students had a choice in the matter, but reflected the different linguistic code employed by these teachers to exert authority over the students.

In a series of articles (Bernstein 1966, 1967, 1971c) quoted by Easthope et al (1975), Bernstein developed a set of ideas relating to social order in schools. The different manner employed by teachers in different types of schools is a reflection of the different social class of the students in these schools. The theoretical strand that informs Bernstein's writing is Durkheim's distinction between mechanical and organic solidarity.

> " … social order arises out of the hierarchical nature of the authority relationships, out of the systematic ordering of the differentiated knowledge in time and space, out of and explicit, usually predictable, examining procedure. Order internal to the individual is created through the formation of specific identities. The institutional expression of strong classification and framing creates predictability in time and space" Bernstein (1971: p. 63).

As a way of maintaining students' attention

In between explanations, teachers asked questions as a way of maintaining students' attention to their talk.

> *"Have you understood? Does anyone have doubts?"* (Vimala, GAH)
>
> *"What are you looking at?"* (Sairabano, GBG)
>
> "Where is your classwork? Is this your classwork?" (Savitri, PU)
>
> "What are parasites? Upasti (to a boy) (pause), you want to see who is going outside, stand up and see (pause). No? What are parasites (pause)? You don't know the answer? Shall I repeat it?" (Kaveri, PI)

Monitoring students' task completion

This type of question was routinely asked in all the classrooms observed and they are familiar to most of us. For example, *"Have you finished?"; "Could I see your notebook now?"; "Have you completed writing the notes?"*

5.4.2 Questions Asked as Part of the Instructional Discourse in the Classrooms

Examples of questions used by teachers during the teaching of content (instructional discourse) are presented below:

To check at which point the teaching has to be resumed

In some of the classes recorded at the government schools, teachers asked the students what topic had been covered and then proceeded with the lesson. Some examples of this type of questioning are given below:

Charumati (GBG) asked her students at the start of the lesson: "*Have we done cells? What is a cell?"* Once the students responded to these two questions, she was able to locate her place in the topic and proceed with the lesson.

Sharada (GAH) asked her X standard class: "*What had we done last time? Had we covered finding the square roots of numbers that are perfect squares? How do we find square of a one digit number? Of two digit? Of three digit?"* Each time, she received an affirmative response chorused out by some of the students. After this, she proceeded with demonstrating how to work out square roots of numbers having decimals.

Gayatri (GAH) asked at the start of a IX standard physics class: *What are we doing?*

Students: *Electric circuits.*

Gayatri: *Static electricity finished?*

Students: *Oonh miss.*

This type of questioning by the teacher to actually locate the class's place in a lesson was not observed in private schools. In the government schools where field work was undertaken, the teachers seemed to genuinely require reminders about where they had left off and from which point in the lesson they needed to continue. This may be interpreted as a somewhat mechanical approach to lessons by the teachers. Teachers taught the lessons in the same invariant sequence as they occurred in the textbook. As already described, the lesson transaction, in most instances, consisted of directly reading out and paraphrasing information given in the textbook and therefore required no prior planning by the teacher. The even more mechanical task of a place holder in the text could thus be delegated to the students. These questions, asked at the beginning of the lesson could also be considered to be part of the structuring moves, as defined by Bellack et al. (1966). Structuring moves set the stage for solicitations and response related to the lesson to be taught.

To establish the context of the lesson to be taught

Very often, the teachers in the government schools moved straight into the lesson after ascertaining where the previous lesson had left off. No further structuring questions were felt to be necessary and were considered a waste of time and effort by the teachers. However, in some lessons, teachers began with recall questions as a way of establishing the context of the lesson to be transacted in terms of its content, as this extract at the start of a VII standard class in GAP showed:

Shanta: *What is element?*
Chorus: *Elements are substances that contain only one kind of matter.*
Shanta: *One of you say it.*
Boy: *Elements are substances that contain only one kind of matter.*

Shivraj began his lesson to IX standard at PU by telling the class to be silent and then asked the context establishing question.

Shivraj: In the last session, we are learning kinetic energy. What is kinetic energy?
Boy1: (Stood to answer – indistinct)
Shivraj: What is energy?
Boy2: (No response)
Girl (last bench): Energy is the capacity to do work.

At PI, at the start of a class for VIII standard students about sound energy projects, Sheela began by asking students to recall the ideas they had generated for investigation. This had been done in the earlier class.

Sheela: What were the questions? (the reference was to the project the students were working on).
As she elicited responses to the questions, she wrote them on the board, radiating outwards from the central word, "project". The phrases were "relate it to waves, etc"; "identify musical instrument"; "how is sound produced"; "modify"...

Clearly, Sheela was not trying to help students recall particular information in this case, but setting the context for the students' classroom task by referring back to the ideas generated in the previous class, which would form the basis for the project they had to work on in groups.

To emphasise key ideas/concepts/information to be memorised

These questions were typically heard in the lessons of the government school teachers but were used to varying extents by teachers in the other schools. Although students in the international school did not have to memorise answers, extracts presented in the section on revision indicated that teachers asked questions that required students to recall information considered important. Examples of these have been described earlier and a few more have been included here:

While taking a class for VI standard in the government primary school, GAP, about food, Vijaya used the familiar structure of making a statement, repeating it with emphasis on the key word and then immediately turning the sentence into a question.

This extract was from a lesson about polygons taught to standard IX, by Savita in the government girls high school:

GBG.L.26. (English medium)
Savita: A polygon is a closed figure. It is bounded by three or more than three sides. (Savita then translated this sentence into Kannada). The sides have to be coplanar and non-colinear. (She explained coplanar in Kannada by giving example of the blackboard and the door and talking of lines drawn on them). With all these points, can you say what a polygon is?
Girl: A polygon has three sides or more than three sides that are coplanar and non-collinear.
Savita: Now take down, a polygon is a figure enclosed by (pause) enclosed by (went to the blackboard and began writing) three or more line segments which are coplanar (pause), ... coplanar, non-collinear (pause), non-collinear and intersecting each other.

To elicit the expected 'right answer'

Teachers often used a series of questions to elicit the right or expected answer to the question as in the case of Bindu and Sheela at PI, who were trying to lead the students to the desired answer about the food group present in vegetables. Some teachers, however, merely indicated that the answer given was not the expected one, repeated the question or directed the same question to another student.

In the following extract, it can be noticed how Shanta indicated that the answer given was not the correct one.

Shanta: *How many alphabets in English? (pause) Twenty- six (emphasis). How many alphabets? (pause)*
Chorus: *Twenty six.*
Shanta: *How many elements?*
Chorus: *Three*
Shanta: *Annh? How many?*

Chorus: *109.*

In the following extract from a revision class in Biology taken by Arati in the private school, it was possible to notice how the teacher was trying to get the students to arrive at the correct answer. The IX standard students were revising the lesson about micro organisms and diseases.

PI.L.27. (English medium)

Arati: Diseases spread through air (pause). Can any one tell how?
Girl 1: By cough.
Arati: Yes, but don't just say cough, add something to it.
Boy 1: When they cough.
(Girl remained standing)
Arati: When who coughs?
Boy1: Humans.
Arati: All humans?
Boy 1: Yes.
Arati: If any one coughs, (pause)... we will get disease? Infected person (emphasis)

Eder (1982) noted that teachers rarely acknowledged student remarks that are not topically relevant. This was noted in the discussion lessons held at the international school, but sometimes as in the case of Shivraj, it was possible for the teacher to leave unacknowledged, a student question even if it was relevant to the topic. Teachers everywhere tend to maintain control over the discourse in the classroom. Shivraj's lack of response to the student's question about the speed of electrons revolving around the atom could have been a way of avoiding loss of epistemic authority in the classroom. Both Farrar (1988)

and Carlsen (1988) noted that teachers may use sequences of questions to maintain tight control of discourse topic.

Speaking from the sociolinguistic perspective, Carlsen (1991) offers a possible explanation for the teacher-dominated interrogative style of instruction so commonly found in a variety of classrooms across different school types. Although such a style of instruction may reinforce an imbalance of speaking rights, at times this may be necessary in the classroom. Active student verbal participation in a lesson may frustrate the teacher's wish to get through the planned material. Sustained questioning of a single student, although cognitively valuable, may cause restlessness and loss of interest on the part of other students. Students may generate questions that the teacher is unable to answer. These explanations may seem speculative, but they indicate the complex, multiple goals of classroom instruction.

Studies by Mishler (1975a, 1975b, 1978) indicated that first standard students react very differently to questions from their teacher than to questions from their peers. Responses to teacher questions tended to be shorter and declarative. Students and teachers also differed in the way they responded to questions in general. Teachers, tended to take control of the flow of discourse away from students who asked questions, often by responding with another question. Mishler argued that these and other characteristics of classroom discourse reflect role relationships between participants, especially along lines of authority and power. His interpretation is helpful in understanding why

student questions are, in general, rare in classrooms. Given the status difference between teachers and students, interrogation of the teacher may be viewed as socio-linguistically inappropriate to students and teachers.

In this context, it was interesting to note the degree of student interrogation that took place in a class by Meena in the international school, before she asserted her control over the discourse and moved the lesson in the planned direction. During a tenth standard chemistry lesson, Meena did her best to respond to a very persistent line of inquiry by a student. The extent of student interrogation observed in this class was exceptional and was not observed in any other classroom. In this instance, the teacher actually went to the extent of empirically verifying the phenomenon. An extract of this class has been presented in the section on the use of experiments in teaching science that follows.

5.5 ROLE OF EXPERIMENTS

The National Curriculum Framework 2005, Position Paper on science gave importance to the place of experiments in science teaching, by stating, "Experiments are the hall mark of science, and for science learning, they are essential" (p.4). Further on, referring to the upper primary stage (standards VI and VII) the document has stated, "Science concepts to be taught at this stage should be chosen so as to make sense of everyday experiences. Though most concepts should be arrived at from activities/experiments, a rigidly inductive

approach is not necessary" (p.13). At the secondary stage, the document recommends, "Experimentation, often involving quantitative measurement, as a tool to discover/verify theoretical principles should be an important part of the curriculum" (p.15).

In the early 20th century, the progressive education movement had a major impact on the nature of science teaching in general and on the role of laboratory work in particular. John Dewey, leader of the progressive education movement, advocated an investigative approach and "learning by doing".

At about the same time, in the Indian context, Gokhale wrote that teaching science in schools without experiments was to treat science as similar to history,

> "In our schools, we teach Science just as we teach history. Schools with laboratories are very rare, and if there is a cupboard, it is filled with costly apparatus purchased from foreign countries, which the teacher, most naturally, is unwilling to allow the boys to touch, lest they break it. The teaching is confined only to the lecture room. The teacher talks and the boys – sometimes – listen. All facts are told, principles stated, and occasionally verified by the teacher in the presence of the class or by students in some schools. The boys' power of observation is seldom called into play, and his judgment never.

> In a college, a student gets more lectures, more facts, and out of these, he generally verifies a few – just enough to give him and impression that Ganot and Newth are infallible. This is the *cultural* effect that remains." (Gokhale, 1927,p.34)

5.5.1 TEACHERS' BELIEFS IN THE IMPORTANCE OF EXPERIMENTS

The teachers in the schools studied for this research were convinced about the role of experiments in teaching science. The ideal of teaching science with the help of experiments was held by all the science teachers, across the different schools. Teachers in the primary as well as the high schools acknowledged the place experiments ought to have in teaching science.

When asked whether teaching science was different from teaching another subject like social studies, Shanta (GAP) said, *"Yes, here we can show experiments, there we have to give points and develop them – we can use pictures of ministers, maps, oceans. I have taught social studies to V standard, it came out well. I like teaching social studies too."* During another interaction after a teaching period, she said, *"If all equipments are there, we can show children. If we do experiments, children learn better."*

In response to a similar question about teaching science being different, Savitri (PU) responded, "Of course, some of the things can be shown in the lab." After speaking about history being concerned about events that had occurred in the past, which cannot be directly shown, Savitri added, "Here we can show, they will believe. They can understand so nicely and when we

show slides and all." Shantala and Shivraj (PU) also expressed that students should be taken to the laboratory and shown "practically". Shantala said, "Only having laboratory is not enough. Whatever is required for experiments should be there. We should not teach distillation by only drawing diagram on the board. We should do it practically and show – demonstration – only then, they can answer it well. Either we can do it in the classroom or take them to the laboratory."

At the international school, Sheela said, "We take them to the laboratory or bring things to the classroom and show the children. Here we have all the facilities."

What was noticed is the importance teachers gave to being able to "show" experiments. The following extracts were from classrooms in different schools where the teachers used experiments to "show" phenomena to students.

5.5.2 EXPERIMENTS AS DEMONSTRATIONS

An attempt has been made here to present instances where teachers in the different schools performed experiments to demonstrate phenomena that were described in the textbooks. At GBP, one of the government primary schools studied, no experiments or demonstrations were conducted during the period of observation by this observer. However, it was possible to observe experiments in all the other schools visited during the course of this research.

Demonstration 1, GAP

At the government primary school, GAP, Shanta was taking a lesson on light for VII standard. Shanta had brought a laser torch, a mirror and a sheet of paper to support the lesson about reflection of light. She had explained, using phrases and sentences directly from the textbook, about reflection and the difference between uniform and diffuse reflection. She had also written notes for the students to copy on one half of the blackboard and on the other half, had drawn the familiar diagram to show reflection.
Shanta: *... smooth surfaces and rough surfaces. Now, I will show you an experiment with a laser battery.* (the teacher used the words 'laser battery' and not the Kannada terms)
The 46 children in this class were seated on the floor of a smallish classroom. Their knees touched as they sat cross-legged on the floor. The teacher's desk was to the left, near the blackboard and by the window. I was seated at the back row. As the teacher placed the objects for her demonstration on the table, I could not see them from where I was seated. I asked the girls beside me if they could see and without really trying, they whispered "Yes" to me. Two boys were standing by the teacher's table.
Shanta: *Come line by line and see.*
The boys went first, individually or in pairs. Then, it was the turn of the girls and they went up to the teacher's desk in groups of three or four.
Shanta: *Fast, fast*
As the children went up to her desk, she flashed the torch and told them to look at the reflected spot on the paper. Not all the children were observing carefully, some did not even look at the mirror or the torch, and seemed to merely go through the motions of walking up to the teacher and after nodding a quick affirmative in response to the teacher's question, "Did you see?" they got back to the floor. As the children went up to the desk, the teacher quickly told them to notice the spot on the paper. On average, children spent about 15 seconds at the table.
Shanta (to a boy)*:* Ai *goobe*[5]*, look here. Why are you looking at the mirror? You want to see your face?*
After the children had all taken turns and walked up to the table and back to their places on the floor, the teacher again repeated the explanation about light rays reflecting off smooth and rough surfaces.
Shanta (pointing to the light spot on the white sheet of paper): *Is the paper rough or smooth?*
Boy: *Rough.*

[5] the word *goobe* means owl in Kannada and is used in a pejorative way. The word has not been translated to retain the flavour of the original utterance.

Shanta: *Goobe*! *Can't you see it? Rough is it? It is smooth*.
Shanta (to class): *What is uniform reflection?*
The class read out aloud from what was written on the board.
Shanta: *What do we call reflection off rough surfaces?*
Chorus: Non-uniform reflection.
The teacher tried to show the reflection off rough surfaces by shining the torch on the wall and asking the children to note whether the spot was clear or diffuse. Since the spot on the wall looked fairly sharp, she concluded that the wall was also a smooth surface. She next moved on to reading out from the textbook where an experiment with aluminium foil was described as an example to observe reflection off a smooth surface.

Demonstration 2, GAH

At the government high school, GAH, Vimala was teaching X standard with 83 students. Vimala wrote the name of lesson in Kannada on blackboard - "Useful Plants". Next, she asked asked a girl student to read. The girl student got up to read. She read fluently and the class was silent. Sitting on the last bench, I could observe the girl next to me underlining and circling words in her text book. A boy at the back of the class seemed to be asleep. Three students were seated on the floor as the benches were full and overflowing. The students were seated: girls to one side, and the boys to the other. After some initial questions by way of recapitulation of previously learned knowledge, Vimala explained about types of plants. She was very clear, there was no confusion. She moved on to explain the importance of flowers as reproductive organs of the plant. She then removed a hibiscus flower from a plastic bag and enumerated the parts as she held the flower up in front of the class. She paused after pointing and naming a part and the class repeated after her in chorus fashion.
Vimala: *I will point to a part and you have to name it, only the person I ask.*
She pointed to a boy, mentioned his name and asked him to name the parts of the flower that she was pointing to. He did this and Vimala proceeded with the lesson.

Demonstration 3, GBG

At the government girls' high school, GBG, VIII standard was having a Physics lesson. Girija explicitly stated that she was taking the lesson because the researcher had come to observe. Thirty-nine girls were seated at their benches and Girija began the lesson by asking some questions to recapitulate previous knowledge, and then pulled a bar magnet out of the bag she had been carrying and held it up for the students to see.

Girija: What magnet is this?
Chorus: Bar magnet.
Girija: Do you have a compass?
A girl handed over a compass used for drawing circles to Girija. Girija held the magnet in one hand and showed the compass being attracted to it.
Girija: What is compass made of?
Chorus: Iron.
Girija (louder voice, slower articulation): Magnet attracts iron
Girija: What is the first point?
She wrote on the blackboard:

I. ATTRACTION

Magnet attracts iron, cobalt, nickel

Girija (aside to the researcher): I could not get cobalt or nickel, only iron I showed.
Girija*:* I freely suspend the magnet.
She suspended the magnet from a loop of green thread that she took out from the plastic bag and then held it up. Before the magnet could come to rest, Girija arrested its oscillation.
Girija (aside to researcher): I don't know what direction.
Girija: Next point... (pause) Freely suspended magnet comes to rest in the north – south direction.
She then wrote this statement below the previous one that she had written on the blackboard.

II. Freely suspended magnet comes to rest in North- South position.

She proceeded to demonstrate that when the bar magnet was dipped in iron filings, the filings clung to both ends of the magnet. After showing this, she wrote the next point on the blackboard.

III. Ends of a magnet have more attraction power and are called poles.

The fourth point to be demonstrated was that each pole of the magnet had the same strength. For this, Girija held up the magnet and from one pole suspended two paper clips one below the other and showed that a third paper clip could not stay suspended. She did the same with the other pole of the magnet. She wrote on the board:

IV. Both poles have same attraction power

Girija: Next point.
She held up two magnets, bringing their like poles together.
Girija: See, north pole and north pole (pause)... there is repulsion.
She then turned one of the magnets to bring the other pole near the first magnet
Girija: And between south pole and north pole, there is attraction. Like poles repel and unlike poles attract. Can you tell when a north pole and a north pole come together?
There was no response from the students.

Girija: (handing over magnets to a girl in the first row) *You try... (pause) Fast.* (Took the magnets back*) What happened?*
Girl 1: There was repulsion.
The two magnets were then passed from student to student and in approximately 5 minutes, the magnets were handed back to the teacher.
Girija: *So what happens?*
Girl 2: When we bring north and north, there is no attraction (pause).
Girija: That is repulsion.
Girija then wrote the next point on the board:

V. Like poles repel and unlike poles attract.

Girija: Now what are the properties of magnets (erases what was written on the board).
Girija rapidly called on five girls one after the other. The girls called upon did not immediately respond and Girija without pausing called the next girl and so on, till Girl 2 was asked and managed to respond, but before she could complete her answer, Girija interrupted and spoke out the points that had been previously written on the board.

Demonstration 4a, PU

Shivraj was at the introductory phase of a lesson about pendulums and periodic motion for standard VIII with 42 students. As I entered the class, five minutes past the scheduled time, the class was already underway. Four boys and a girl were standing up in their places. This indicated that they had been asked questions and had not been able to answer to the teacher's satisfaction.
Shivraj: What is periodic motion?
Boy (who was already standing): Motion which repeats.
Shivraj (prolonged pause): Anyone, what is periodic motion? (the children who were standing up have been motioned to sit down by the teacher and they resume their seats).
Girl (standing up to answer): Motion which repeats in equal intervals of time.
Shivraj (pause): Motion which repeats (emphasis).
Shivraj: Give examples of periodic motion.
Girl 2: Rotation.
Girl 3 (overlapping with G2): Revolution.
Shivraj: Rotates where?
Girl 2, Girl 3 others (overlapping voices): space (tentative).
Girl 4: clock hands.
Shivraj: Hunh?
Shivraj: Now we will see periodic motion.

He had brought a pendulum bob, thread and stand to the classroom and he proceeds to fix the pendulum on the teacher's desk. He set the pendulum in motion.
Shivraj: What type of motion?
Chorus: To and fro.
Shivraj: Yes (pause)... What type?
Several girls: Oscillation.
Shivraj: Yes, it is also periodic motion.
He arrested the bob at the mean position.
Shivraj: What is this position?
Chorus (girls voices seem to dominate): Equilibrium.
Shivraj wrote on the board:

equilibrium

Shivraj: Frequency (pause)... It is the number of oscillations in one second. This is a stop watch. (holds it up) If I press this, it will start. Here if I press, it will stop. When I start it, you count.
Shivraj set the bob in motion and also started the stop watch. The students counted in chorus. At the end of 30 seconds, the clock was stopped and the count had reached 22.
Shivraj wrote on the board,

22 oscillations 30s

Shivraj: How many oscillations in one minute?
Boys (front bench, responding immediately, almost before the question is over): 44

Demonstration 5, PI

Meena was teaching X Standard, ICSE section with 11 students. The class was about calculating the concentrations of solutions and the teacher, Meena, had mentioned at the start of the class that the students would do problems based on Mass/Mass, Mass/Volume and Volume/Volume. She also wrote these terms on the board. After teaching the class how to calculate the concentrations in the first two cases, she took up the last type of calculations.
Meena: Now we will do volume by volume. Let us consider 50 ml. of ethyl alcohol and 75ml. of water.
Girl: But what is the volume of the solution?
Meena: The volume of mixture, shall I say?
Other students (overlapping Meena's talk): Volume of solution will be adding the two volumes; volume of alcohol plus volume of water.
Girl: Salt in water (pause)... it will go into the spaces.
Meena: In liquids, the volume will be added.
Girl: They are immiscible.

Meena: You are confusing. In salt, there is intermolecular forces, there is interaction (pause) ... Polarity of water, ions are there and so (pause) ... the bonds break when water molecules surround the ions.
Girl: But if they mix, their molecules will go in between each other, the volume won't increase.
Meena: You have to take into account temperature, pressure...
Girl: Let us take, temperature, pressure as constant, whatever, still the volume cannot increase if they are mixing.
Meena: You are confusing (pause) ethyl alcohol and water.
Girl: They are not miscible? If they mix, there should not be change in volume.
At this point, the Meena went into an explanation about water being polar, and ethyl alcohol being organic, and also polar and therefore the two would be miscible. She also mentioned acetone. It appeared that she had missed the reasoning of the student about the volume of a solution of miscible liquids not being equal to the sum of the two volumes before mixing.

Girl: Even if the volume does change, I want to know why (pause) if they are miscible, they should fit in the intermolecular spaces.
Meena: Think of particle size, sodium ions, they are small, ethyl alcohol molecules are organic, larger molecules (pause)... Let us get alcohol and water and actually do it practically, you will see.
Girl: Even if volume changes, I want to know how it happens?
Meena went off and fetched alcohol, measuring cylinder and water in a beaker. She poured alcohol in the cylinder, up to the 15 ml mark. Neither she, nor the students looked very closely/carefully at the cylinder to take the reading. Meena was about to pour the water from the beaker into the cylinder when the girl and a few other students objected.
Girl and others: Is it 100ml.? (referring to the water in the beaker)
Meena asked another girl to go and get another measuring cylinder.
Meena: She wants me to do it and show and then she will be satisfied.
Girl: No, even if the volume doesn't change (implying if the volume of the mixture turns out to be the sum of the volumes of the two liquids before mixing), I want to know how?
Meena proceeded by mixing 85ml of water in the second cylinder into the first cylinder containing alcohol. The researcher was positioned too far behind to actually see the reading but this was the measure called out by Meena as she held the cylinder up for the seated students to see. She was standing before the students.
Meena: Exact see...
(As far as the researcher could see, there had not been a precise reading at any point in this exchange.)
Several students: Mix it.

Meena poured it back once into the other cylinder and held it up for the students to see. The volume appeared to be the same as before, though again neither the students nor the teacher took a very close look.
Meena: Chitra will be very upset if I waste alcohol, it is expensive.
Without any more discussion, Meena moved on to dictate two more problems for homework and then gave out test papers.

One element common to each of these instances of teachers performing an experiment for demonstration was that the role of the student was that of a spectator. These were not instances where teachers practiced the investigative or inquiry approach where students "learn by doing", although the example of Meena's demonstration could be considered to be more in that direction. In all the cases recorded above, the demonstrations were used largely for confirming and illustrating information learned from the teacher or the textbook. In the case of Meena, a close reading of the liquid measures would have shown that the volume of the solution was lower than the sum of the volumes of the two liquids. Thus, the experiment was used by Meena to pass on her own misunderstanding of the phenomenon.

This orientation was questioned during the 1960s, (Hofstein &Lunetta , 1982) when "new" science curricula were suggested, resulting in several departures from tradition in the role of laboratory work. Shulman and Tamir (1973) proposed the following classification of goals for using experiments in science education:

(1) to arouse and maintain interest, attitude, satisfaction, open-mindedness and curiosity in science;

(2) to develop creative thinking and problem-solving ability;
(3) to promote aspects of scientific thinking and the scientific method (e.g., formulating hypotheses and making assumptions);
(4) to develop conceptual understanding and intellectual ability; and
(5) to develop practical abilities (e.g., designing and executing investigations, observations, recording data, and analysing and interpreting results).

From interactions with teachers, it could be said that their main purpose in carrying out demonstration experiments in the classroom was aligned with the first goal in the list presented above. The other four goals were not kept in mind during the demonstration experiments observed at the various schools in this research.

It was also noticed that in all the instances presented above, the demonstrations took place in the classroom and not in the laboratories. The remarks made by Shanta, quoted earlier, indicated that she saw a similarity in the use of experiments in the science classroom with the use of pictures and maps in the social studies classroom. This suggested that experiments were seen by her as visual aids to learning and not as processes where students could use material to conduct investigations. Girija spoke explicitly about using demonstration experiment as a motivational strategy. She also said, *"When inspectors come, they want to see motivation."* This statement

indicated that such use of experiments was part of the official discourse on education and held as an ideal, not necessarily to be practised.

These instances of demonstrations in classrooms suggested that:
a) teachers were operating in a traditional framework of science teaching that has emphasised the learning of scientific "information", concepts, principles, and facts with little emphasis on helping students develop the scientific attitudes of inquiry, formulating hypotheses, testing and experimentation.
b) they were following a much older tradition within science itself, the empiricist scheme of knowledge.

Using the concepts developed by Bernstein (2000) about the pedagogising of knowledge, traditional science teaching could be said to be an example of the 'performance model'.

> "The pedagogic discourse here issues in the form of the specialisation of subjects, skills, procedures which are clearly marked with respect to form and function. Recognition and realisation rules for legitimated texts are explicit. Acquirers have relatively less control over selection, sequence and pace. Acquirers' texts (performances) are graded, and

> stratification displaces differences between acquirers. Classifications are strong" (Bernstein 2000 p.44).

The teachers in each case were using demonstrations to illustrate and thus reinforce the knowledge contained in the prescribed textbooks.
Within the older empiricist schemes of knowledge, of which school science is a subset created by the official recontextualising fields of the boards of education, the "ultimate warrant for a claim to knowledge is an act of witnessing" (Shapin, 1988). Three kinds of problems were recognised to attend the privacy of solitary individual observation. First, the transformation of mere belief into proper knowledge was considered to require the transit from perceptions and cognitions of the individual to the culture of the collective. All classroom demonstrations required a collective act of witnessing the phenomenon being demonstrated.

The second problem was to do with possible corruptions and biases in the perceptions of the experimenter. Both these problems could be mitigated by ensuring that both witnessing and consideration of knowledge claims took place in a social setting. When Meena, performed her demonstration to show that the volume of a solution of two miscible liquids is the sum of the volume of the pure liquids, she called upon the whole class to witness her perception of the phenomenon.

The third problem was related to the contingent practical problems attending the circumstances of observation. These were variously managed by the teachers concerned as they attempted to establish the 'scientific facts'.

In the pedagogising recontextualisation field of the classroom, it is possible to discern similarities with the initial discursive field of knowledge production in 17th century England. The crucial difference is, of course, that the classroom is a field of reproduction of knowledge and not one of its production. In the early stages of empiricist science, the credentials of the knowledge-producing agents were socially established and followed the social hierarchy of society at that time. Shapin (1988) elegantly discusses the "ineradicable problem of trust that is generated when some people have direct sensory access to a phenomenon and others do not." Further,

> "The public display of the moral basis of experimental practices depended upon the form of social relations obtaining within these sites as much as it did upon who was allowed within. Indeed, these considerations were closely related, and I discuss how the condition of gentlemen and the deportment expected of them in certain places bore upon experimental social relations and, in particular, upon the problems attending the assessment of experimental testimony" (Shapin, 1988)

In the classroom where knowledge is to be reproduced in the form of legally acceptable texts governed by the evaluative rules of the pedagogic device, students constitute the witnessing public. Access to the venue of the demonstration is restricted to a certain set of students at any given time. The range of expected behaviours of the students is circumscribed by the regulative discourse of the classroom which also dictates the social positioning of the teacher and the taught. Similar to 17th century England, the experiment itself had to be managed. In the case of the original discursive field of knowledge production, the management of the experiment was part of the process for discerning knowledge from artefact. In the classrooms, the management of the experiment took place in order to illustrate the already known fact and strengthen the authority of the textbook and also the teacher. Meena holding up the cylinder at a level where only she could read the graduations, Savita arresting the magnet at some stage in its motion were both clear instances where the experiment was managed by the teacher. In the case of Shivraj, his attempts at management of the experimental results could be seen in the following extract (a continuation of the section already described).

Demonstration 4b, PU

Shivraj, after defining the terms "frequency", "time period" and "amplitude", once again set the pendulum in motion and as before, the students started counting aloud the oscillations when he started the stop watch. As the stop watch needle reached the 30s mark, the counting stopped. (Students had been instructed about this). The count had reached 21.
Shivraj: I will make it 20.

He wrote 20 on the chalk board.
Shivraj: Now with a small amplitude.
Again the pendulum was set in motion and the class counted in chorus, as the count reached 22, the teacher stopped the clock.
Girl: It is 23
Shivraj wrote 23 on the board and erased the 0 of the 20 that he had written earlier and replaced it with a 1, so that it now read 21.
Shivraj: There is a very small variation in the time period with amplitude.
He calculated the ratios 21/30 and 23/30 on the board and arrived at 0.7 and 0.76 respectively.
Shivraj: This is first law of simple pendulum – time period does not change with amplitude. (emphasis) Write down.

Clearly, this teacher considered it important to transmit precisely the canonical knowledge and did not consider it worthwhile to spend time in the classroom discussing the observations that seemed to be at variance with the text in the prescribed book used by the students and teachers. His initial articulation, "There is a very small variation in the time period with amplitude" was immediately replaced by his statement of the first law of simple pendulum, as per the textbook. During a subsequent discussion on the nature of science, Shivraj spoke of the imprecise nature of scientific knowledge. However in the classroom, he saw his role as a relay for canonical knowledge as enshrined in the textbook. The students, in their turn, did not see fit to question what was stated either in the book or by their teacher and were willing to accept their own inability to observe accurately.

The management of experiments was also necessitated by three other factors in addition to the main imperative of transmitting the officially accepted knowledge presented in the textbooks.

i. Teacher's lack of familiarity with the phenomenon to be shown.

ii. The constraint on pacing of lesson content dictated by the 'performance model' of the pedagogic discourse.

iii. Contingent factors operating in each school.

Teacher's lack of familiarity with the phenomenon to be shown.

This was seen in the cases of Shanta (GAP) and Meena (PI). Shanta had an insufficient understanding about the phenomenon of reflection as mentioned in the textbook. She should have realised that the spot on the wall was due to the torch light falling directly on it and that if the wall was as smooth as the mirror she should have been able to place a paper and see the spot corresponding to the reflected spot that appeared on the paper after reflection from the wall. Meena too, did not seem to know that when ethyl alcohol and water are mixed, the volume of the solution would be less than that of the sum of the volumes of the unmixed liquids. She went on to 'show' experimentally the opposite.

The constraint on pacing of lesson content dictated by the 'performance model' of the pedagogic discourse.

Teachers were accountable in each case for student performance as evidenced through exams and tests where the texts produced by the students were evaluated by externally defined criteria. This did not allow teachers much

leeway in terms of content or pacing of lessons. One would opine that it actually was a disincentive for teachers to spend time setting up inquiry-based experiences in the classroom.

> "Tests often emphasised student ability to identify or recall facts at relatively low taxonomic levels but seldom have assessed development of higher level skills that involve application, analysis, synthesis, and evaluation (Bloom, 1956). Even if laboratory work does contribute to success on conventional achievement tests, it may do so insufficiently. Equal time spent in drill might well have greater payoff in test performance" (Hofstein & Lunetta 1982).

In each of these cases, teachers confined the experiment to a single teaching period and ensured that the students had opportunities for drill in the appropriate texts to be produced for the examinations. An argument can of course be made whereby a different set of student texts get legitimacy in the examinations in order to make it more worthwhile for teachers to spend more time on experiments. This could well be done within the performance model in pedagogic discourse. Though couched in a different theoretical framework, the NCF position paper on science teaching seems to suggest that performance model is in operation by stating, "Third, the overpowering examination system

is basic to most , if not all, the fundamental problems of science education" (NCERT, 2006: p. v).

Contingent factors operating in each school:

In the government schools, teachers were further constrained by the large number of students (ranging from 40 to over 80) in each class and lack of adequate physical space for experimental demonstrations. In the private school, this was not the case, but teachers did not seem to see sufficient rewards in terms of the much-valued gain in student achievement flowing from time spent in experiments. In the international school, laboratory work was specifically planned and scheduled and any time for impromptu investigations stemming from student questions would have to be squeezed out from precious classroom teaching time. On one occasion, Meena felt impelled to deny students' request to miss Chemistry class to practice choral music for an upcoming event, as she would be short of time and would not be able to drill in numerical problems that students seemed to need to do well in their exams. This gave an indication of the time constraints under which teachers operated and made decisions about how to allocate classroom teaching time across different activities.

Thus far, the broad similarities in the instances cited have been discussed. There were evident differences based both on the individual teacher and upon the location of the events described. It can be said that Shanta

(GAP), Savita (GBG) and Shivraj (PU) wove their demonstrations into their lessons and were able to draw out the teaching points. Vimala (GAH), Shanta (GAP), Shivraj (PU) and Meena (PI) did not allow manipulations of material to be done by the students at any stage and the students were expected to 'see' what was being shown by the teacher. Girija (GBG) did allow students to handle the magnets in turn, although she may not have provided sufficient time for students to do this. During the measurement of the time period of the pendulum, the students were directly and audibly involved in counting the oscillations and thus could be said to have a more active role in generating an 'observation'. The collective act of 'witnessing' was clearly evident in this class.

Shanta actively directed the students' gaze, scolding them if she thought they were looking elsewhere. This represented a very strong control of students' movement and even volition.

Control over students appeared to be tightest in the case of government schools. It was noticed that in none of the government schools did any students ask a question or speak about the experiment unless explicitly required to do so in response to the teacher's question. This was noticed not only during the demonstrations but also during other teaching periods. A large-scale study of teaching practices in Karnataka, found that out of over 8,000 students, only 15 students asked a question in classes (Clarke, 2003).

In the case of the private school, where the students were involved in the process of verifying the laws of pendulum, a girl student was able to inform the teacher about the count, instead of merely being asked to repeat an observation made by the teacher. In the international school, the demonstration was carried out in response to one student's persistent questioning. Although as, in the other demonstrations, the teacher did 'manage' the experiment, the students could direct the teacher's action to some extent, as when they asked her to "mix it". Thus, it could be seen that the demonstrations carried with them the similar social positioning of the teacher as the epistemic authority as in the classrooms. However, what was also observed was that students in the government school did not question their teachers. In the private school, dominant students such as class leaders did occasionally cross question their teachers. In the international school, students on several occasions raised inquiry questions and sought to examine the verity of what was being told to them by the teacher. In all cases, the teachers maintained their epistemic authority in the classroom. The embedding of the instructional discourse within the regulative discourse was as evident during these processes as elsewhere. It was interesting to note that students from the international school could direct the teacher's actions to some extent and that this was never observed in the other schools studied.

5.5.3 TEACHERS' REASONS FOR NOT USING EXPERIMENTS OFTEN

Despite the explicitly held ideal of performing experiments to teach science, these episodes were not commonplace in the classrooms. Girija explicitly stated that she was carrying out the demonstration out of a sense of obligation to the researcher. She said, *"I planned Math, but for you I will give science.*" It could be said that when emphasising the role of experiments in teaching science, the teachers were speaking in what Keddie (1971, p135) called the "educationist" context rather than the teacher context. "The fundamental discrepancy between the views of teachers as they emerge in these contexts can be expressed as that between theory and practice" (Keddie 1971, p.135). She explained this further by quoting Selznick on the difference between doctrine and commitment:

> "Doctrine, being abstract, is judiciously selective and may be qualified at will in discourse, subject only to restrictions of sense and logic. But action is concrete, generating consequences which define a sphere of interest and responsibility together with a corresponding chain of commitments. Fundamentally, the discrepancy between doctrine and commitment arises from the essential distinction between the interrelation of ideas and the interrelation of phenomena" (ibid.)

Keddie was writing in the context of educationist ideals about pupil abilities held by the teachers and their views of pupil abilities as expressed in practice. In the context of teaching science, a similar discrepancy could be seen in the difference between the stated ideal of teaching science through experiments and of rarely performing even a demonstration in the classrooms.

Teachers in the schools under the KSEEB gave their own justifications for not performing experiments, mostly to do with lack of time. They said that as such there was not enough time to "cover the syllabus" and that if they spent classroom time for setting up experiments, they would not be able to finish the portions. Students in these schools were examined only through written tests and were not evaluated for their skills in performing experiments.

Since teachers explicitly held the ideal of experiments being important in science teaching, but did not include many experiments in their classroom teaching, it could be said that the teachers themselves were evaluating their actions using the performance model. Bernstein (2000, p.46) described the evaluation orientation that is characteristic of the performance model, "Here the emphasis is upon what is *missing* in the product." Thus, the teachers' justifications indicated their awareness of what was missing in their teaching of science.

Another reason given for not matching up to the ideal was the lack of a laboratory or equipment or both. Shanta (GAP) said, *"If all equipments are there, we can show children. If we do experiments, children can learn better.*

Here there is no lab. Whatever is there, we use and show. No chemicals here. What chemicals – sulphur, acids, nothing is there." She showed the researcher a cupboard in the headmistress' office where several boxes of chemicals were stored and said, "*See all chemicals, they are expired. Last time I did the experiment, it never made the blue litmus red."* Among the chemicals kept in the cupboard, were red phosphorus, manganese dioxide and sulphur and these do not change their properties or 'expire'. In the high school, GAH, located in the same compound, there was a considerable stock of equipment of various kinds, but these were stored in a small room approximately 2 meters by 3 meters in dimension. Vimala said, *"The school has everything except a laboratory."*

Sharada who taught Physics at GAH, when asked about doing experiments for teaching said, "Physics is like that only. Nothing to show, no experiments." When it was pointed out that there were a number of things in the store that could be used for demonstration she said, "If I go there, I have to search for one hour, one hour!*"*

The lack of time was cited by several teachers as a reason for not taking students more often to the laboratory or for performing demonstrations in class. As discussed earlier, this reflected the priorities derived from a pedagogic discourse that emphasised achievements in examinations where accurate recall of information was rewarded. In the international school where the evaluation procedures specifically required students to be able to perform

experiments, laboratory periods were scheduled regularly. How far these periods were serving the stated aims of the curriculum will be discussed later in this chapter.

At GAH, Gayatri candidly admitted her lack of familiarity with much of the equipment in the school store. She said, *"In my B.Sc., they did not show us all this. We did not do these experiments."* After asking one of the X standard boys to fetch the keys to the science store, Gayatri was randomly pulling out boxes from the cupboards and examining their contents. She would often hold something up and inquire about its name or function. The boy who had opened the keys to the store also stood around as various items were picked up and examined by Gayatri. When a box of magnets was opened and a suggestion made that these could be used for demonstrations during a class on magnetism, the boy said in defense of his teacher, *"She has shown them to us. She shows us many things."* When it came to demonstrating the working of an electric bell, of which several models were available in the store, Gayatri mentioned that there was no electricity supply in the school, so how could she show that. It was suggested by this researcher that she could use a 12 V power supply for demonstrating the bell. Gayatri asked, *"How can I get that – I don't know what to ask for and where to get it!"* Surprisingly, she also said that she did not know what a power supply looked like. When a box of tuning forks was opened, she joked about not needing to use them since the syllabus had changed since. Gayatri said, *"They have removed the chapter from the*

syllabus. See it takes may be ten years by the time these kits are developed and supplied. By then the syllabus has changed." This remark was followed by laughter.

5.5.4 AN INTERESTING DEMONSTRATION

Shanta, unlike other teachers in the primary schools GAP and GBP, made efforts to set up at least a few demonstrations for her class. The extract below is about Shanta setting up a microscope, the only one available in the school, in the VII standard classroom:

Demonstration 6, GAP

While the researcher was exchanging greetings with the Headmistress in her office, Shanta walked in and spoke to her about setting up the microscope. Vijaya, the VI standard science teacher, told Shanta that she would send in the students from her class as well. In the VII standard classroom, the microscope was set up on the teacher's desk and about four or five students were crowded around it as one of them was peering into the instrument. Shanta yelled at the students to move and looked into the microscope herself. The objective lens of the microscope appeared to be too far away from the stage.
Shanta (allowing a student to look in): *Can you see?*
Boy: *Oonh miss.*
Shanta: *What did you see?*
The boy went to the blackboard on which already several circles with spots were drawn and drew a circle. Next the boy used the chalk to mark spots at random within the circle.
Boy: *Dot, dot, black* (chukke, chukke, kappuge)
Vijaya came to the door of the classroom with VI standard students lined up behind her. As the students jostled and pushed their way towards the desk, Shanta moved away from the instrument and that allowed the researcher to quickly take a look. Surprisingly, there was no eyepiece on the microscope. This was pointed out to Shanta, who then pulled two eye pieces from the wooden microscope case that was lying open and sideways on the floor. The researcher inserted one of the eyepieces and looked inside the microscope and could not see any cells in the viewing field. Shanta was standing up close in an

authoritarian stance. While she was conversing with the Vijaya, the researcher tried focusing the microscope, but found the ratchet mechanism jammed. The researcher turned the lens assembly to bring the other objective lens into alignment to see if this brought the cells into focus, reasoning that Shanta had already shown cells to the students. There was dried up sliver of onion skin stretched directly on the viewing stage, rather than being placed on a glass slide. When asked the reason for this, Shanta declared that there were no glass slides available at the school. Taking care to make her movements covertly (in order to avoid undermining Shanta's authority in the classroom), the researcher placed a drop of water on the onion skin. Shanta turned her focus back to the microscope and the researcher removed the eyepiece thinking that she may have focused on the cells without it, and that it could be due to the fact that Shanta wore thick spectacles.
Shanta (after looking into the microscope): *Hey, I could see, why can't I see now! Who has shaken this?*
At this point another teacher, Shankari, who taught social studies to the VII standard, walked in and re-inserted the eye piece.
Shankari: *This is 10 x, give me 15 x.*

She then moved the objective lens assembly so that no lens was in alignment and kept trying to make out something through the microscope. The researcher intervened to click the objective lens into alignment and asked her if she could see. Shanta took another look into the microscope, this time with the eyepiece.
Shanta: *Ah, now I can see.*
The researcher took a look again and realised that what Shanta could see were the dirt spots on the lens. Meanwhile Shankari took a look.
Shankari (looking puzzled and fiddling ineffectually with the focusing mechanism): *But this isn't how cells are supposed to look.*
All this while, Vijaya was trying to maintain order among the jostling VI standard students and the seated VII standard students were getting increasingly restless.
The researcher (to Shankari): *How are cells supposed to look?*
Shankari: *They should appear as lines, lines.*
The researcher: *Like bricks?*
Shankari: *No, like this* (drew a four horizontal wavy lines one below the other and then drew vertical lines intersecting these to represent rows of cells).
By then Shanta had started to allow the VI standard students to look in to the microscope. One by one, they walked up the instrument and dutifully peered inside with one eye closed in an imitation of their teacher's way of looking in. Not all of them had noticed this and if they tried to look into the microscope with both eyes, Shanta yelled at them.

Shanta: *Goobe, close one eye and look inside with the other!*
Shanta (to a girl): *What did you see?*

Girl shook her head to indicate that she had seen nothing.
Shanta: *Nothing! Goobe, are you blind? Look again. See you can see black spots (*chukke*), those are cells (*koshika*).*
Many students were able to see the circle of light with black dirt spots and dutifully reported it, some drew the same on the board. By now, other teachers were coming in to take a look and these included HM and Ravindra. Whenever a teacher came, the students had to give place for the teachers to look into the microscope. The students soon resumed looking into the microscope. Shanta questioned students occasionally.
Shanta: *What is this?*
Student: *Telescope.*
Shanta: *No, it is a microscope.*
Shanta: *What did you see?* (To a girl who seemed to have just cursorily glanced into the instrument).
Girl: *Onion.*
Shanta: *Onion?!* (smacks the girl on the head) *Look again! Goobe*! *Is it an onion you see there?*
Girl looked confused.
Shanta: *See the spots, they are the cells in the onion skin. Look carefully. Now go.*
Shanta (to researcher): *She says she saw an onion!*
The whole situation was noisy and full of excitement. After the VI standard left, the VII standard students again crowd around the desk to take a look. Shanta had left the room. The children began pushing, shoving and complaining to the researcher. The researcher had to physically hold back children as they queued up to the instrument in order to allow the child at the instrument some room to look. The students tended to stand jammed up close against each other and pressed forwards.

After a while, the researcher told the students to hold off for a bit and pressed down on the ratchet and managed to get the focusing mechanism to engage. The researcher swiftly lowered the eyepiece and managed to focus on the cells. The researcher then called in the other teacher, Shankari, and after viewing the cells, she nodded.
Shankari: *Yes, now the lines can be seen.*
As Shanta came in, the researcher showed her the cells too. She looked at the cells but said nothing. The researcher pointed out the positions of the lenses and explained that the objective lens had to be quite close to the object to get a clearly focused image. The Saturday mid-day meal came in and the class began to empty.
Shankari (to Shanta): *Wipe the instrument before putting it away*.
Shanta wiped the microscope and then tried to jam it into the box and the researcher felt impelled to assist by turning the box the right way up and taking hold of the microscope in order to prevent it being roughly handled.

The researcher instructed the boy who was waiting to carry the microscope to its place, about handling the box carefully. Shanta had left by then to supervise the mid-day meal distribution.

This episode was interesting for the number of insights it yielded. These insights were as follows:

a) Shanta was an exceptional teacher:

Shanta seemed to be very motivated, even brave, to set up the microscope in the classroom. Her qualifications were, SSLC, TCH, which meant that she had studied up to the secondary level and then taken up teacher training followed by a career in teaching. Since the Karnataka Secondary Education Examination Board did not examine students in laboratory work at the end of high school, many schools did not provide for laboratory experience for students. Shanta had completed her SSLC in 1976 and said that her school did not have any laboratory. She mentioned that they had been shown a microscope once during her teachers' training. Her handling of the microscope indicated her inexperience with the instrument. When asked whether Shanta had been to any in-service training, she mentioned trainings on yoga and 'joyful learning'. There was no specialised in-service training for teaching science at the elementary level and the State Institute for Science, a wing of the DSERT, established to promote science education in primary and secondary schools in the state, did not conduct in-service training for elementary school teachers on science teaching. Given her own limited familiarity with the equipment and experimental procedures, Shanta was

exceptionally motivated to set up experiments and demonstrations in the classroom.

b) Audience recruitment into the discourse of science

The experience with the microscope generated a lot of interest among other teachers and many of them were interested enough to come and take a look. This also indicated that such an experience was unusual for them. Gooday (1991) discussed the embedding of microscopic practice within a morally cogent power-laden discourse of 'Nature', and the strongly political use of this discourse to recruit mass audiences for domesticated life science in 19th century England. It could be argued that Shanta herself had got recruited into this discourse and that the microscope had been sufficiently domesticated to make an appearance in the elementary school classroom, but still carried with it the semiotic of power. Shanta had the power, through her setting up of the microscope, to make people see what she said they were seeing – cells that make up an onion skin.

Using Bernstein's theorising, it could be argued that Shanta and the microscope were part of the pedagogic device that served as a relay for the hierarchical power relations within science along with other structures of control. Reflexively analyzing the situation, the researcher could also see her own relationship of power in this situation, although the researcher chose to exert power covertly by altering the setting of the microscope without being noticed. Again, her positioning in the power relationship was due to her longer

socialisation into the culture of seeing with the microscope and being sufficiently schooled to be able to discriminate between the artefact produced by dust and other particles in the lens assembly and the 'real cells' of the onion skin.

c) The construction of cells as black spots in a bright circular field

The students were made to see what the teacher saw, drew and described cells as *'black spots in a bright circle'*. This was not surprising in the context of the strongly framed curriculum where the teacher exercises maximum control over knowledge (Bernstein, 1971). In such a classroom, as Sarangapani (2003 p.127) described it, "The teacher is the primary actor, deciding what will or will not be done, who will do what, etc." In the episode with the microscope, the teacher decided what the children would see as well as the meaning they would ascribe to what they saw. Her control over the students' vision was also evident in the episode with the laser torch and mirror that was earlier described in this chapter.

Reflecting with surprise on his own position as an epistemic authority, Thomas Huxley wrote,

> 'Nothing is more surprising to me than to find a number of instructed persons coming up here for scientific education, and to discover that they cannot observe. They have been so accustomed to take statements on credit from books and word of mouth that they have almost lost the

> faculty of seeing things for themselves. I remember after having given a lecture, accompanied in my ordinary way by drawings on the blackboard, that I went to look through the microscope, and to see what one of the students who had heard this lecture was drawing. To my astonishment, I saw that his drawing was the thing I had drawn on the blackboard not the thing under the microscope . I said to him, "What is this? This is not at all like what is under the microscope". "No" he said, "that is what is on the blackboard." He did not believe in Nature, he believed me; and the great lesson I have tried to teach which is the fundamental basis of scientific teaching, is do not put too much faith in your teacher but do believe nature.' Huxley (1882) quoted in Gooday (1991)

In the microscope example, it was startling to realise that Shanta was defining what was being seen as her reaction to the girl who said she was seeing an onion indicated. Once several students had seen and dutifully reported both verbally and through drawing, it was likely that students who took their first look into the microscope would have already formed an idea of what they ought to be seeing. Learning to see through a microscope does involve this sort of direction of vision; otherwise it is difficult for the eye to focus on the object to be viewed rather than any number of other things that were equally under view.

It was also interesting to note that the nature of cells as black spots was disputed by the teacher, Shankari, not because that was not what they looked like to her, but because that was not cells were supposed to be like. Cells were supposed to appear as *"line, line"* rather than *"dot, dot".* Of course, this would have been true cells in onion skin and not all types of cells. Bacteria, for example, could legitimately appear as "dot, dot", thus there could have ensued a dispute about what exactly was being seen under the microscope. However, the other teacher seemed to have been limited by her own single experience of seeing cells through a microscope and had then accepted that that was how cells were supposed to be.

Collins (1982), Latour and Woolgar (1986), among others, have shown that the enculturated expertise of a hierarchy of experimental workers in a research laboratory is habitually pitted against that of rival groups in other laboratories. In such situations, disputes characteristically arise in which each group contests the competence and interpretation of experiments carried out in other laboratories; such disputes are resolved by the negotiation of a consensus amongst the laboratory groups concerned. With regard to the resolution of such disputes, Bruno Latour has discussed the intriguing claims made by scientists concerning the agency of 'Nature'. Before a consensus is reached, what 'Nature' does or says in the disputed phenomenon is the central issue of disagreement between experimenters, and yet when a consensus is subsequently attained, experimenters claim that this is because 'Nature' has

unequivocally intervened to act as a referee in the dispute (Latour, 1986, p.96-100).

There is a potential for similar disputes over competence and interpretation in the teaching laboratory, yet in the science classroom such disputes generally do not arise. Why should this be the case? When relatively unskilled students, or teachers as in the episode described above, carry out their own laboratory experiments, how are contestations about competence and interpretation prevented?

Atkinson and Delamont (1977) have argued that effective teachers use two general strategies to pre-empt such disputes: (i) instrumentally stage-managing the outcome of experiments to yield only one possible 'correct' result, and (ii) restricting the experimental discourse of students to prohibit them from constructing divergent interpretations of results. As can be seen from the epigraphic quotation above, T. H. Huxley also invoked 'Nature' as the source of laboratory authority responsible for leading a student to the 'correct' experimental result in microscopical histology.

In the above episode, we see the tacit collusion of both Shankari and this researcher in helping Shanta maintain her epistemic authority. Since this transaction was embedded in the regulative discourse operative in all the classrooms, it was unlikely that an effective loosening of the framework surrounding the discourse would have been possible, had we chosen to dispute the epistemic authority of Shanta. This confirmed the assertion that the

intrinsic rules of the pedagogic device, like the intrinsic rules of the language device are relatively stable (Bernstein, 2000: p.28).

5.6 USE OF LABORATORIES

The laboratory has been a distinctive feature of science education. Hofstein & Lunetta (1982: p.202) wrote, "The history of laboratory work as an integral part of school science learning has roots in the 19th century. The laboratory in the science classroom has long been used to involve students in concrete experiences with objects and concepts." As early as 1892, Griffin (quoted in Hofstein & Lunetta, 1982) wrote about the successful introduction of the laboratory in schools and claimed that pupils would go out from the laboratories "able to see and do".

Unlike the classroom demonstrations that shared many similarities across schools, the use of laboratories was different in the three types of schools observed**.**

Government schools

GAH had a very wide and varied inventory of laboratory equipment and each year, the teachers systematically checked the items present against the stock register. There was an OHP machine and over fifty charts on various science topics. However, on no occasion were these used by the teachers as part of the classroom instruction. The senior physics teacher, Sharada with 22 years of experience, responded to the researcher's queries about use of laboratory

equipment or charts by saying that she was very hard pressed for time since she also had administrative responsibilities such as acting as headmistress when the headmistress was not present and officiating as the High School In-charge. She also mentioned that in the beginning of the academic year, 2006, she had been asked to go and attend two training workshops and therefore she was already short of time and had to rush to finish the portions for the tenth standard. She said that she was trying to take more than the allotted number of periods in order to complete the syllabus for the examinations.

The other teacher, Gayatri, was more open to the idea of using equipment or charts for the class. She had voluntarily taken this researcher to the store where the equipment was kept and had shown various laboratory apparatus. By way of explanation for not using these in class, she mentioned that she did not quite know the use of some of the equipment and requested this researcher's help with the equipment.

The laboratory spaces in the government school were grossly inadequate and therefore not used at all. In GAH, the designated room was little more than a store for experimental equipment. There was no way more than two or three people could have worked in the room at any given time. Not surprisingly, given the lack of adequate space, despite being provisioned with a wide range of equipment and instruments, the teachers did not use them either to perform demonstrations or to promote experimental skills among the students. At GBG, the lab was a small room that had become the de-facto

room of the assistant teacher, Shivanna, who chose to sit separately from the other staff members.

The primary schools, GAP and GBP, did not have any provision for a laboratory, or even a science room. At GAP, classrooms were in short supply and there was considerable pressure on space, so it was unlikely that a room could be spared to set up a laboratory, even had there been the will to do so. At the GBP, the appointed science teacher was often away from the school in connection with his role as a functionary of the teachers' association and no other teacher was sufficiently motivated to create a laboratory or science corner for the students. Primary school teachers, in any case, did not consider themselves as specialists in science teaching and in this respect, it could be said that Shanta was exceptional in choosing to teach science to the VII standard and also make the effort to set up at least a few demonstrations for her class.

Private school

The private school, PU, had a fairly large and well-appointed laboratory as described in the third chapter and students were occasionally taken to the laboratory by their science teachers. Observations of two instances of teachers in this school taking their students into the laboratory are presented below.

PU.LabI

Two weeks prior to this episode, in the course of teaching a lesson on heat, Shantala had told the students of standard VII that she would take them and

show them experiments about the effects of heating. During an afternoon period, Shantala had lined up her students to take them to the laboratory. In response to an inquiry about the experiment that she was planning to conduct she said, "*There is no equipment in the lab to do an experiment. These students are insisting that I take them to the lab."*
Shantala entered the laboratory followed by the students. The lab had work tables made of granite supported on masonry. The table tops were a little dusty. There were a few jars of zoological specimens, a plastic skeleton about 30 cm high in a glass fronted box and chemicals stored in an overhead shelf. The room itself was fairly spacious and well lit.
Shantala ordered the students to gather around work table saying, "Come here. Don't you want to see? If you make noise (pause)*."* On one of the wall mounted shelves, there was a clamp stand with a pendulum hanging from it. Shantala asked the students where they had seen this metal bob before. They had not actually seen the bob earlier. One of the boys, the class leader, recalled the experiment that Shantala had described during her classroom teaching. She had drawn a diagram to illustrate the experiment on the blackboard. The experiment was about a hoop and metal bob on a chain that could be passed through the hoop when cold, but not when it was heated. Shantala acknowledged the boy with a small hand gesture. Next, she picked up a flask and placed it on the table, "What is this? (pause) ... This is a round bottomed flask." She then proceeded to show and name sundry glass ware and when it came to the Leibig's condenser, she spent a little more time explaining how it worked, saying, "We learnt about distillation, no? (pause) This is the distillation apparatus . See this tube coming out here, this is where the cold water comes in, and this other tube... this is for the water to come out. We can collect the distillate from this side." In about 15 minutes, the students were led back to their classroom and it was time for them to take down some notes in the form of questions and answers dictated by the teacher.

PU.Lab2

In another incident observed in the school, Shivraj was doing a revision class on optics for standard IX. He quizzed the students about various optical instruments. The instruments described in the textbook were camera, simple microscope, telescope and binoculars.
Shivraj: What kind of lens is in camera?
Students (overlapping voices, not distinct): Convex.
Shivraj: Convex. (pause) What kind of image is formed?
There were various responses, overlapping with each other and several students said "inverted".
Shivraj: Yes, it is inverted and then we turn it around.

This statement was followed by a somewhat confusing explanation about the development of images from a photographic plate with reference to negative image. About 15 minutes of class time had elapsed and Shivraj said, "Let's go and see the optical instruments on the lab."

The girls, who numbered 19 in a class of 33, were asked to come first and this evoked mild protest from the boys, but Shivraj did not respond. In the lab, Shivraj mounted an impressive-looking brass- and leather-covered telescope onto a tripod stand and screwed on the eyepiece after pointing out the lens in the eyepiece. The girls then joked and talked with each other as they took turns to look into the telescope. One of them, the class leader, deliberately blocked the view by placing her hand across the objective lens while another girl was looking. This evoked general laughter. Nothing was spoken about what could be seen through the instrument, how it could be focused, or what types of lenses were used. Shivraj handed a pair of binoculars to the leader and said, "Note the difference." Most of the girls were barely paying attention to either instrument and in about five minutes, they were sent back to class and the boys were asked to come to the laboratory. The boys too took turns to look through the instruments amidst some laughter and talk. One of the boys, who had inadvertently stood in front of the telescope, was slapped on the arm by Shivraj. His startled look provoked a great deal of laughter among his peers. The boy looked embarrassed and walked out of the laboratory, but returned soon afterwards. Another boy said, "In binoculars, it looks bigger than in telescope." One or two boys turned the binoculars around and discovered that objects looked further away this way. Less than five minutes after the boys entered the laboratory, the bell sounded and the period was over.

Walking back to the classroom, Shivraj said that apart from knowing the names of the optical instruments, the students would have to draw ray diagrams as well and he would *"give the ray diagrams in the notes"*. In the class, the next question in the textbook was located and Shivraj told the students to copy the ray diagram from the relevant figure in the textbook. He admonished students to pay attention to the arrow marks on the rays. He explained that the arrow marks indicated the direction of the light rays and that the students would not get marks if they did not put in the arrow marks correctly in their test papers.

The question that arose from these instances was about the possible reason for the school investing resources to set up a laboratory that was not being used except as a symbolic space. The laboratory and the equipment functioned in the same way as the specimen jars in the laboratory did – as things to be

viewed by the public. The laboratory served as another space where curiosities were gathered and exhibited, like in museums or zoos. It was unthinkable for the teachers as the guides – who were like the guides accompanying tourists around monuments – or the students as spectators, to take on even in simulation, the role of the scientist who used the laboratory to conduct investigations and perform experiments. Though the laboratory in this school did have the potential for such a use, the pedagogic recontextualisation field produced an instructional discourse that did not facilitate it.

In contrast, one could say that Shanta and Savita, both of whom worked in government schools were manipulating instruments and material to set up a demonstration. The demonstrations took place in the classroom setting and involved the active agency of the teacher. If the use of the laboratory described above was analogous to that of a museum or a zoo, the demonstrations were analogous to that of a performance of magic. The teacher was like a conjurer who produced his magic tricks, not in some specialised location, but wherever his viewers were seated.

From the instances discussed thus far, two meanings for the use of laboratories for teaching seem to have emerged:

(1) As an idealised but non-existent space that could be used for the sort of demonstrations which now had to be imperfectly performed in the classroom. This meaning seemed to be implicit in the actions and statements of teachers in the government schools.

(2) Second, as a specialised symbolic space associated with science, through which teachers may take students on a guided tour. It served as a facsimile of the 'real laboratories' where scientists carried out their activities resulting in discoveries and inventions that benefited society. The science laboratory occupied a space in the school's architecture somewhat similar to the globe that was displayed prominently in the headmaster's office.

It has been mentioned earlier in this chapter that the high school science curriculum prescribed by the Karnataka Secondary Education Examination Board (KSEEB) does not require students to pass a 'practical exam'. Typically, passing a practical exam as required by some of the other Secondary examination boards would require students to display skills in manipulating equipment, making measurements, recording observations and drawing some conclusions based on the observations. Had such an examination been mandatory, it would have impacted the pedagogical discourse pertaining to teaching science in the schools. Schools would have had to provide some direct experiences for students to practice the skills that would have been tested through the practical exam and this would have led to a different meaning obtaining for the school laboratories as in the case of the international school.

International school

This school was affiliated to the CIE, UK, and the CISCE, India and offered the IGCSE and ICSE curricula in standards IX and X. Both the CIE and CISCE have practical examinations for students appearing for their secondary school certification examinations.

The CISCE syllabus for the X standard stated that for the examination in physics, "There will be one paper of one and a half hours duration carrying 80 marks and Internal Assessment of practical work carrying 20 marks." For the internal assessment of practical work, the syllabus states (CISCE, 2007),

> "Candidates will be asked to carry out experiments for which instructions will be given. The experiments may be based on topics that are not included in the syllabus but theoretical knowledge will not be required. A candidate will be expected to perform simple experiments, to take suitable readings and to present these readings in a systematic form. He/she may be required to exhibit his/her data graphically. Candidates will be expected to appreciate and use concepts of least count, significant figures and elementary error handling.
>
> **Note:** Teachers may design their own set of experiments preferably related to the theory syllabus. A comprehensive list is suggested below."

The CIE syllabus for combined science for the secondary level stated that a 20% weightage in the examination will be given for practical work. The syllabus stated the importance of experimental work as follows (CIE, 2007),

> "Experimental work is an essential component of all science.
>
> Experimental work within science education:
>
> • gives candidates first-hand experience of phenomena
>
> • enables candidates to acquire practical skills
>
> • provides candidates with the opportunity to plan and carry out investigations into practical problems.
>
> This can be achieved by individual or group experimental work, or by demonstrations which actively involve the candidates."

Regarding assessment of practical work, the CIE syllabus stated (CIE, 2007),

> "Scientific subjects are, by their nature, experimental. It is therefore important that an assessment of a student's knowledge and understanding of Science should contain a component relating to practical work and experimental skills.
>
> The experimental skills and abilities to be assessed are:
>
> C1 Using and organising techniques, apparatus and materials
>
> C2 Observing, measuring and recording
>
> C3 Handling experimental observations and data

C4 Planning, carrying out and evaluating investigations

The four skills carry equal weighting."

It was therefore not surprising that students at PI had weekly laboratory periods during which they had to conduct a series of experiments according to the instructions given by their teachers. Laboratory manuals were available for reference, both for the teachers and the students. Presented below is an extract from a chemistry laboratory class.

PI.Lab 3

Meena was taking a chemistry practical class for the ICSE X standard students. She went to the classroom and fetched the students to the laboratory which was on the first floor. The laboratory was large and had work benches equipped with reagent shelves, sinks and test tube racks. There was a raised platform with a large desk for the teacher and just below this was another table from which the laboratory assistant could dispense chemicals to the students. There was a computer on the teacher's desk, a blackboard on the wall behind the desk and a display board on the wall next to the students' work benches.

Students entered the laboratory talking and laughing among themselves and spread around to occupy the work spaces at the table. There was considerable movement and laughter. Someone broke a test tube. Students had instruction sheets detailing the procedure they had to follow for the detection of sulphates. Meena dispensed sodium sulphate from a reagent bottle as students walked up to her desk carrying test-tubes. She said to one student who had come up to her for the second time, "Only one spatula, o.k?" The laboratory assistant dispensed concentrated acid as students walked up to her and held out their test tubes. She cautioned students to be careful and dispose the acid carefully. A boy wanted to know whether that was because the acid was expensive, "No, it is corrosive, not expensive" was the response given by the assistant. Students had observation sheets where they had to fill in their observations in the spaces provided. The students followed the steps of the experiment mechanically while continuing to converse and laugh.

Meena called out the names of individual students who seemed to be especially boisterous. The researcher asked a girl who came up to the counter for acid, what the experiment was about. In response, she told me what the next step of the procedure was. In about 15 minutes, the students had completed their experiment and Meena yelled at them to quieten down and write down the analysis for different anions that the class had done in this and

the previous three or four laboratory periods. The analysis carried out had been for carbonates, nitrites, nitrates, sulphides and sulphates. Meena dictated and the students wrote down. She asked a few questions as she dictated the procedures, "If a brown gas is evolved, it is a nitrate. What is the brown gas?"

She received a murmured "NO_2" in response. About five or six students did not bother to write down and carry on a whispered conversations among themselves. Meena called out the equations as she briefly explained the chemical reactions behind the tests for different anions. By now, several students were yawning and two students were just holding their pens poised over their notebooks, but not writing. The class lasted approximately 40 minutes.

Tamir (1976) reviewed a variety of laboratory objectives and classified these as falling into one or more of the following areas that were :

- Skills: e.g, manipulative, inquiry, investigative, organisational, communicative
- Concepts: e.g., data, hypothesis, theoretical model, taxonomic category
- Cognitive abilities: e.g; critical thinking, problem solving, application, analysis, evaluation, decision-making, creativity:
- Understanding the nature of science: e.g; the scientific enterprise, the scientists and how they work, the existence of a multiplicity of scientific methods, the interrelationships between science and technology and among various disciplines of science;
- Attitudes: e.g; curiosity, interest, risk taking, objectivity, precision, perseverance, satisfaction, responsibility, consensus and collaboration, confidence in scientific knowledge, self reliance, liking science.

In the rather typical laboratory lesson just described, where students performed experiments based on a fixed set of instructions and where the outcome of the experiments were pre-determined, none of the above objectives listed for laboratory were met. A framework for viewing the degree of guidance in the learning laboratory has been provided by Schwab (1960) and elaborated by Herron (1971). Three components of the learning situation are distinguished: problem, ways and means of discovering relations, and answers. The matrix below presents in Schwab's terms, the levels of "openness and permissiveness".

Level of openness	Problems	Ways and Means	Answers
Level 0	Given	Given	Given
Level 1	Given	Given	Open
Level 2	Given	Open	Open
Level 3	Open	Open	Open

One may note that Meena's ICSE laboratory class fell into the Level 0 in this instance where the problem, ways and means and the answers were all given or pre-determined. It is perhaps not surprising that students were not really engaged in the class, but just going through the necessary motions. However, not all laboratory classes observed in this school fell into this category. Laboratory classes, especially those for the students studying for the CIE

examinations tended to fall into the level 1 or level 2 category in terms of openness. Students were given problems that were in the form of investigations which they had to conduct according to guidelines or in some instances, design their own investigations to answer the problem. The answers were not pre-determined but open-ended.

Using the same framework of analysis for the episode earlier described, where Meena performed an experiment in response to a student's question, the problem could be said to be open, in the sense it was posed by the student, however the methods were chosen by the teacher. The teacher also had a pre-determined answer which she wanted to arrive at through performance of the experiment.

The dimension of student participation and acceptance of the objectives of the laboratory class was also called into question in the Level 0 laboratory class just described. Larson (1995) in a study of a student culture in a chemistry classroom indicated that the social order created by the students represented their adaptations to educational circumstances, both local and institutional. In Meena's laboratory class, both she and the students seemed to be aware of the routine procedures that students were expected to go through. The students had high ambitions and were all set to achieve good scores and therefore 'suffered' the laboratory class with the aim of achieving the highest grades with the least expenditure of effort and used the time in the laboratory

for some boisterous socialising among them, while going through the requisite motions to perform the experiments.

Student strategies co-evolve actively in response to pedagogic strategies and it would be simplistic to assume that the suggested curricular reform calling for more active student involvement would have the desired effects of achieving curricular objectives. Atkinson and Delamont (1977) show how the 'guided discovery' methods, advocated in the wake of 1960 call for reform in science teaching, is difficult to sustain. The authors described, how, despite appearing to be open ended, discovery methods required “artful stage-management” if they had to be successful. Teachers wanted students to maintain what Atkinson and Delamont call the 'hot science view'. This referred to the students actually treating the experiment as open-ended and as capable affording a range of interpretations. The 'cold-science view', on the other hand, referred to the students' explicit orientation to teacher's prior knowledge stemming from the understanding that the experiment was really a set up to illustrate an already known scientific principle. Atkinson and Delamont (1977) wrote,

> “If the nature of this management is not respected by any one of the parties, then trouble can ensue. By the same token, the interaction can become problematic if the 'stage machinery' becomes too visible in the course of the encounter. In either event, it becomes difficult for the

participants to create and maintain the 'reality-like' nature of the exercise."

It is plausible that students with the cold science view would play along with the suggested investigation and draw the appropriate conclusions in order to 'get on' in the class. Just such a strategy is described by Larson (1995). She described the class of a high school teacher who encouraged students to participate in the process of science through project and chemistry labs. Students often copied from others in an effort to 'get by', rather than discuss the results or procedures.

5.7. DISCUSSION

The discourse which drives the principles of order, relation and identity in the classroom is the regulative discourse (Bernstein, 2000). This chapter has discussed aspects of this discourse in the different schools. The pedagogic practices in the different schools differed in the power and control relations between students and teachers. According to Bernstein's theory, the power relations are analysed through the concept of classification (C) and the control relations are analysed through the concept of framing (F). In the first case, the analysis refers to the nature of the boundary between categories, which can be well marked (strong classification) or can be blurred (weak classification). In the second case, the analysis refers to the nature of the communication between categories, which can translate a control centred on the category

which keeps the power (strong framing) or a control shared by the categories involved in the interaction (weak framing).

In the context of the schools affiliated to the KSEEB, GA, GB and PU, the knowledge to be transmitted within the school was kept distinct from the everyday knowledge present outside the school, and both classification and framing were strong. Gayatri (GAH) explicitly acknowledged this separation while discussing the practical knowledge possessed by some of the students who did the work of winding transformers and her own "textbook knowledge" about transformers. In another instance at PU, which is illustrative of this type of classification between school knowledge and everyday knowledge, Shantala ignored the example given by a student when he mentioned the melting of "*ghee*" in the context of changes brought about by heat.

The framing was weaker At the international school PI some of the teachers, Sheela, Maya and Mohan for example, encouraged students to bring knowledge from their everyday world into the classroom discussions.

Parents of students at the international school (PI) were upper class and had a high income. Some of them were themselves producers of knowledge as authors, software professionals, architects and designers. Parents of children from the government school were from the other end of the spectrum with low incomes and employed in manual labour. The knowledge of the upper class was valued and privileged both in society and within the school, whereas the reverse was true of the knowledge of the labour class.

With respect to the subjects, taught all schools followed a strong classification where science was taught as a distinct area with its own set of curricular objectives. At the secondary level, in standards VIII, IX and X, in all the schools, science was further divided into distinct disciplines: physics, chemistry and biology.

In the government schools, another form of classification was observed, namely the classification between secondary school and primary school. Despite being located within the same school complex, secondary and primary schools followed different time-tables, had separate administrations and distinct sets of teachers. In the case of both the private schools, PU and PI, there was no separation between the primary and secondary school in terms of timetable, administration or teaching staff.

Strong classification also defined the role of the teacher (as transmitter of knowledge) and role of the student (as acquirer of knowledge) across all the schools. This is not surprising given the nature of the pedagogic device. Different syllabi legitimated differing power relationships between teachers and students.

As already discussed earlier in this chapter, teachers in the government and private schools framed the syllabus strongly by controlling student movement, talk and also the pacing of the teaching. Thus these schools exhibited both strong classification and strong framing. However, in the international school, students had more control in the classroom as indicated

by episodes such as the impromptu demonstration conducted by Meena in response to a student's inquiry, the several occasions where teachers had to reason with students to enter the classrooms and begin their lessons and the free-flowing discussion about conservation observed in Mohan's classroom. This school could, therefore, be said to have strong classification but weak framing. As discussed in chapter 3, this school was affiliated to two boards, the CIE and the CISCE and these syllabi seemed to legitimate instructional practices that had weaker framing, allowing students to express their feelings and seek clarifications from the teacher in the classroom.

It was observed that in the government schools (GA and GB) and the private unaided school (PU), the teaching practices themselves were strongly classified in terms of explanations, note-giving and revision. Teachers in these schools maintained these distinctions to a greater or lesser degree. The importance given to each of these practices differed across the schools. In the government schools, highest importance was given to note-giving. It has been discussed earlier in this chapter that teachers, when short of time, would prioritise note-giving over explanation. In the private unaided school, the explanatory phase of the lesson invariably preceded the other phases of the lesson. When short of time, teachers at PU, did not curtail or do away with the explanatory phase of the lesson, but chose to utilise additional periods allotted for other activities for giving notes to the students. At the international school, the teaching practices were not thus classified into explanations, note-giving

and revision. In the case of standard VI at PI, it was observed that student activity was classified into “desk-work” and “discussion”. During “desk-work” students were seated at their desks and received instruction that involved some degree of writing and use of textbooks. During “discussion”, students moved to a carpeted area and sat loosely in a circle while participating in a teacher-led group discussion related to the lesson being taught.

Classroom instruction is embedded in the regulative context as has been discussed earlier in the chapter. Teachers across schools used several strategies to control and direct students’ action and also students’ use of instructional material such as textbooks and notebooks. In the government schools and the private school where instructional practices were strongly classified, the framing was also strong and students were trained to behave appropriately according to the phase of the lesson – not referring to textbooks during the explanation phase, copying in their neat notebooks during the note-giving phase and reproducing the appropriate texts verbally or in writing during the revision phase. The power of the teacher was explicit and the instruction that was legitimised in these classrooms was of a didactical nature mainly concerned with the transmission of knowledge encoded in the textbooks. The effectiveness of the transmission was evaluated in the written tests and examinations which required students to reproduce the answers

dictated to them by their teachers during classroom instruction and which they had been drilled to reproduce during the revision phase of the lesson.

Research by Morais & Antunes (1994) indicates the complex interrelationship between home backgrounds, classroom regulative context and student achievement. Broadly speaking, the schools affiliated to the KSEEB, whether government or private, had similar regulative contexts in the classroom, but the home socialisation of students was different.

Literature about science education points to the importance of the regulative contexts of

science classrooms (Rogoff, 1990, Cole, 1996, Duschl, 2008) Synthesising the learning sciences research and science studies research, Duschl (2008) suggests that science education should focus on three domains: conceptual and cognitive processes; epistemic frameworks and; social processes that shape how knowledge is communicated, represented, argued and debated. These shifts both nationally and internationally represent a shift from strongly-framed curricula towards weakly-framed curricula which enable greater learner control.

What was observed across all the schools was the presentation of science as an accretion of facts based on theory-independent empirical observations. Teachers' use of demonstrations to illustrate or "prove" a "scientific fact" was in keeping with this view of science.

In the context of the schools in this study, the schools with the Karnataka Secondary Education Examination Board curriculum, implicitly support a view of science as an accretion of knowledge and legitimises pedagogy based on behaviourist learning theories. These theories continue to hold sway in the professional training colleges for teachers and this has been discussed in Chapter 6.

However, as discussed in this chapter, actual classroom practices were still strongly framed across the schools and there was little or no conversation between students and teachers in the science classroom, with a few exceptions being seen in the case of the international school PI. The pedagogic relationship was not a dialogic relationship, but instead the teacher was a relay of knowledge that had to be reproduced by the student.

6 TEACHER PREPARATION

In the previous chapter, the nature of the pedagogic discourse in the different schools was discussed. Teacher practices were described and Bernstein's concept of the pedagogic device (Bernstein, 2000) was used for analysing the teaching processes in the schools. It has been suggested by Bernstein (2000, p 28) that the pedagogic device provides the intrinsic grammar of the pedagogic discourse through three interrelated rules: distributive rules, recontextualising rules and evaluative rules. These have been dealt with in some detail in the earlier chapters while discussing observations about schools, teachers and classroom transactions. The recontextualisation rules of the pedagogic device are pertinent to this chapter, which describes and analyses the observations about teacher preparation made serendipitously during the field work.

Recontextualising rules regulate the formation of specific pedagogic discourse. "The recontextualising principle creates recontextualising fields; it creates agents with recontextualising functions. The recontextualising functions then become the means whereby a specific pedagogic discourse is created. Formally, we move from a recontextualising principle to a recontextualising field with agents with practising ideologies" (Bernstein, 2000 p.33). Bernstein further asserts that within the recontextualising field, it is possible to discern an official recontextualising field (ORF) and a pedagogic recontextualising field (PRF). The latter consists of pedagogues in schools and

colleges, and departments of education, specialised journals and private research foundations. According to Bernstein, the pedagogic recontextualising field can have an effect on pedagogic discourse independently of the official recontextualising field. This seems to suggest that there is a source of tension within the pedagogic discourse arising from the autonomy of the pedagogic recontextualising field. Teacher preparation programmes can be said to be constituents of the pedagogic recontextualising field and an understanding of these programmes can illuminate the contours of the pedagogic recontextualising field. An attempt will be made in this chapter to understand the role of teacher preparation programmes in shaping the pedagogic practices of teachers.

6.1. TEACHER PREPARATION PROGRAMMES IN KARNATAKA

In Karnataka, the first teacher training college was started in Dharwad in 1857. A second set of training institutions called Normal Schools (with the sole purpose of training in-service teachers of hobli schools) came into existence in 1868. These institutions would move from place to place after completion of training of teachers at a particular place. The same institutions were later converted into Vernacular Normal schools in 1933 (Govt. of Karnataka, 2001).

Both TCL – (Teacher Certificate Lower) for teachers with Class 8 qualification and TCH – (Teacher Certificate Higher) for teachers with SSLC qualification courses existed prior to the reorganisation of states in

1956. At that time, the duration of these courses was for only one year. The duration of TCH course was increased to 2 years and curriculum was revised in 1966. P U C (XII class) qualification was made a pre- requisite qualification for entrance to TCH course in 1987 – 1988 (Govt. of Karnataka, 2001).

At present, in the pre-service education sector, there are two streams: one leading to the courses of Bachelor of Education degree (B. Ed) in secondary education and the other Diploma in Education (D. Ed) in elementary education. The syllabi and examinations for the B. Ed degree is the responsibility of universities, whereas D. Ed is controlled by the DSERT. The National Council for Teacher Education (NCTE) is the regulatory authority granting recognition and fixing the student in-take for all teacher training institutions.

The curriculum for the TCH course was revised by DSERT and came into force from the academic year 2002 – 03. The revised course was renamed as Diploma in Education (D. Ed) Course. The duration of the course was extended from two years to 2 ½ years to include six months of internship. This was reduced to two years due to popular demand in 2004 – 05 and 3 months internship was made part of the two-year course. Prior to 2003, in the elementary teacher education sector, the state had 134 teacher training institutions providing the Diploma in

Education Course (D. Ed) with a duration of two years. The following types of institutions existed for providing this training:

a. 20 District Institutes of Education & Training (DIETs),
b. 17 Government Teacher Training Institutions (TTIs),
c. 40 private-aided teacher training institutions (TTIs),
d. 57 private un-aided teacher training institutions (TTIs).

During 2003 – 04, the DSERT called for applications for starting new elementary teacher training institutions in the state. In all, 898 applications were received. No Objection Certificates (NOCs) were issued by the government for starting 675 new elementary teacher training institutions. After recognition by NCTE, these institutions started functioning from 2004 – 05. A total of 888 unaided elementary teacher training institutions were functioning as on June 2007. (DSERT, 2007)

Admission to D Ed course is managed by the DSERT through its Centralised Admission Cell (CAC), and is based on counseling on the basis of a computerised list of merit-cum-roster system. For admission to D Ed course, the candidate must have passed II PUC/ XII standard or equivalent examination with a minimum of 50% total marks. In respect of SC/ST/ Category I/PH candidates, the minimum marks is 45 %. A minimum of 50% seats are reserved for women candidates in each category (DSERT, 2007).

The NCTE acts as a regulatory body for all teacher education institutions in the country and since 1995, these institutions are bound by law to seek recognition from NCTE. The NCTE has defined the Norms and Standards for each category teacher education institution. Four regional committees have been constituted under the NCTE and each of these committees has the following roles and responsibilities:

- Consideration of application of teacher education institutions for recognition;
- Permission for starting a new course or training;
- Increase in annual student intake;
- Withdrawal of recognition for contravention of provisions of the NCTE Act;
- Prescribing norms regarding staff, equipment, buildings and other infrastructure.

The National Council of Teacher Education is the designated authority for granting recognition and fixing the intake. The DSERT coordinates all the academic and administrative activities concerning these institutions – prescribing the curricula, preparation of text books, approval of admissions (through the DIETs), approval of appointments of staff in the aided institutions, fixing the academic calendar, disbursement of grant-in-aid (through DIETs), management of government training

institutions, and inspection of private institutions through DIETs. The Examination for the D. Ed course is conducted by the Director (Other Examinations), Karnataka Secondary Education Examination Board (KSEEB), Bangalore.

In the secondary teacher education sector, there were 70 colleges of education, including the Regional Institute of Education, Mysore, providing the one year B Ed degree course in 2002 - 03. In 2003-04, fresh applications were called for starting of new secondary teacher training institutions by the universities and by June 2007, the figure for unaided secondary teacher training colleges stood at 336.

These secondary teacher training or B. Ed colleges are affiliated to various universities in Karnataka State. The curricula are prescribed by the respective universities and the examination is also conducted by them. The National Council of Teacher Education is the designated authority for granting recognition to these colleges every year. The in-take is fixed uniformly at 100 seats per college. The Government quota seats are filled up by a written test and on merit-cum-roster through the Centralised Admission Cell (CAC) every year. Regional Institute of Education, Mysore (a unit of NCERT) and Ramakrishna Institute of Moral and Spiritual Education, Mysore are outside the central admission system.

The DSERT coordinates the management of all the secondary teacher education colleges in the state. It also disburses grant-in-aid to colleges, and approves appointments of staff in aided colleges.

Both the elementary, as well as the secondary pre-service teacher preparation programmes require student-teachers to do practice teaching in schools. In the two-year D. Ed course, practice teaching is compulsory in both the years. The one year B. Ed programme also invariably includes a practice teaching component. During this researcher's field work, it was possible to observe and interact with D. Ed and B. Ed students who had come for practice teaching in the schools being studied.

6.2 TEACHERS' OPINIONS OF PRE-SERVICE AND IN-SERVICE TRAINING

In comparison with other professions, teachers have much shorter periods of specialised education; ie; education specifically for the profession. In Karnataka, typically a higher primary school teacher would have had ten years of general education (SSLC), followed by two years of teacher training if they had entered service prior to 1990. From 1988 onwards, would be teachers were required to complete twelve years of education (PUC) before undergoing two years of D. Ed. High school teachers were required to have a minimum of fifteen years of education leading to a B.A or B.Sc degree followed by one year's teacher training called B. Ed (Bachelor of Education).

In the private school (PU) and in the international school (PI), the teachers who taught science to the VI and VII standards had completed fifteen or more years of education, which meant that they had college degrees in science or science-related subjects like engineering as in the case of Sheela (PI).

From the biographies of the teachers who participated in this research, it was noticed that teachers who taught in government schools had also been educated in government schools. Those who taught in the international school had been educated in private schools. In the private school, out of the four science teachers, two had studied in government schools and the other two in private schools. One of the teachers who had studied in the government school, Shivraj had appeared for the Common Entrance Test for the selection of teachers in December 2006 and had then been appointed to a government school at Gulbarga with effect from May 2007.

All the teachers teaching in the primary schools in this study had the required qualification, a TCH diploma, for teaching in government primary school. All teachers at the high school had B. Ed degrees, with the two exceptions being Sheela and Mohan (see Table 4.1 for their qualifications) who were teaching at the international school. This school had an in-house programme for teacher training in collaboration with Cambridge International Examination Board.

Practicing teachers were specifically asked their opinion about teacher training. Almost all teachers expressed that training was necessary, but were

not unequivocal about the effectiveness of training. Teachers said that training was necessary as the state recruitment policy mandated that only trained teachers should be offered permanent postings in the government schools.

Government Primary Schools (GAP, GBP)

Higher primary teachers had completed the TCH, which has since been replaced by the D. Ed. The course content of the TCH programme was spread over 2 years. It consisted of the core subjects of general education and pedagogical theory and practice in teaching with scope for preparation of teaching learning materials. During discussions about the efficacy of pre-service training, over 70% of the teachers said that they did not find the training very useful. They opined that it was the practical experience of teaching that helped them learn about it.

Shanta*: TCH is not the main thing – practical is important. When we actually go and teach, we come to know.*
Vijaya*: Training is needed. We can learn how to teach children, to what level, what path to take, we get from training. Which lesson is to be taught how – we get from training.*
Shanta also responded in the affirmative when asked whether she thought that school experience was useful for beginning teachers. When asked about the usefulness of in-service training, Shanta and Vijaya from GAP spoke of these positively.
Shanta: *Inservice training? Yes, I go for them.*
When asked if she liked any specific training, she said, *"Jeevana Vignana, yoga, dhyana, vyayama – I liked. In another I learnt about TLM (teaching learning materials). I find workshops and trainings useful" (translated from Kannada).*
Vijaya said that in-service training workshops introduced new methods, new lessons and activity-based teaching through songs and dance.

Differing sharply from Vijaya and Shanta, Manjunath from GBP felt that under the new scheme of the SSA (Sarva Shiksha Abhiyan is a flagship programme of the Government of India to achieve universalisation of elementary education in a time-bound manner), a lot of money was being spent on trainings that did not serve much purpose. He seemed to be implying that trainings were being held in order to spend the money that was available. Jayanthi (GBP) spoke about the earlier system of having two school inspections in a year that allowed the schools to function without frequent disruptions. Both she and Manjunath spoke about how the subject inspectors would observe their teaching and then, "*they would sit and teach us wherever they thought we needed to learn more" (translated from Kannada).*

Government high schools (GAH, GBG)

Teachers in the high school had varied opinion on the efficacy of the B. Ed (Bachelor of Education) that they were required to complete in order to qualify for teaching at the secondary school level. Vimala (GAH) expressed that she found her B. Ed training *"50% useful".* When probed further about what in her B. Ed she had found useful, she said, "Lesson planning. In a given time what should be the main teaching points, how to evaluate the students – that and all we learnt there only." (sic). When asked to comment on whether Vimala applied what she had learnt at B. Ed in her teaching, she said, "We cannot use what we learnt in B. Ed here – heavy strength. I adapt to the

situations." Sharada from the same school also had a similar opinion about the inapplicability of "B. Ed methods*"* in her regular teaching due to the large number of students in each class. Gayatri (GAH) on the contrary, expressed that her B. Ed training really helped her in her teaching. The teachers at GBG stated that the B. Ed qualification was necessary in order to qualify to teach at the high school level, but were not very open in reflecting upon the effectiveness of the training. Charumati, who had decided to take up a job after her second child, began going to pre-school, said, "B. Ed is needed if we want to teach in higher classes. Even though we may know the subject, they will ask for B. Ed." Sairabano said that she had enjoyed her B. Ed training, but in general felt that only a small part of it was really relevant in her everyday teaching. She said that the practice teaching was more useful than the theory portions that just had to be "mugged up*"* for the examinations. Similar opinions were expressed by the other teachers in this school.

Private School (PU)

Like the high school teachers in the government school, the teachers in Tunga Public School, seemed to have opted to do B. Ed as it was required to for teaching the higher standards. However, they differed in their perceptions about the usefulness of the programme. Shantala felt that there was not much difference in her teaching after training. She said that as part of the training she had "learnt steps of taking lesson – introduction, body, conclusion.*"*

Further she said, "Non –trained teacher can also teach. B. Ed is not helping. I got confidence because I am a B. Ed, I have the degree. I expected many things (in training) – new techniques, more steps that I may get help for teaching – this I didn't find." She felt, "Only experience helps to teach better."

In response to a question about improving B. Ed, Shantala said : "Good teacher means understanding children's needs; whenever they need, we have to give accordingly; how to teach below average children I need help in that, some methods to teach such children . B. Ed cannot help, the textbooks cannot solve the practical problems, only when we face the situations daily, we can understand and come to know how to teach better."

Shivraj, however, differed from Shantala in his perceptions about teacher training and said that B. Ed was useful. He said, "There are differences between trained and untrained teachers." He mentioned that during training "I learnt about planning, steps of lesson, psychology of children, mode of presentation and totally got idea to teach." Shivraj added, "B. Ed helps a lot to reach the children – knowledge is not enough." In response to further questioning, he clarified that he felt both training and experience were important, rather than just experience.

Another teacher at this school, Arati said about B. Ed, "It must be there, the techniques are useful – technical aspects of a lesson …..We learn how to teach children, that is useful and training should be there. Of course, all things of B. Ed you can't take and apply there – the theory part, that doesn't

work. But technical part, how to teach ... that I use." In this, Arati seemed to be sharing the common perception about the greater value of learning the practical aspects of teaching lessons during the B. Ed course as compared to other parts of the course, which were perceived as dryly theoretical.

International School

This school differed from the other schools by having strong in-house training and professional development programmes for teachers. Teachers like Sheela, who did not have a professional qualification in education, were given support in their teaching in a number of ways. Sheela spoke about the school's willingness to train her on the job, seeing her interest in teaching. "They knew my intention and were ready to train me as I was fresh." Sheela mentioned that the school had "trainers*"* who gave the teachers workshops and helped them develop as teachers. Supportive trainings were held every year in the school. As Sheela put it, "Anything new in the world is shared and given out to us. Sharing is encouraged, that is very important."

In her own case, she felt that earlier she was more "emotional" in her approach and now was "more technical" and getting better in her teaching. She felt that the school was open to teachers trying out new ideas. "Like, I have met a lot of teachers from other schools. They say - we can't do that in our school – here we can." Two years into her teaching career, Sheela felt that she had developed into a much more skilled and competent teacher, but

mentioned that “Everyday you learn – from the kids”. In this context, it is interesting to note that Doyle (1988) had estimated that it takes at least 5 years for a novice to master the demands of teaching. Sheela, in her third year of teaching, still considered herself to be a novice with more to learn about teaching, in line with Doyle’s estimate of the time required for a novice teacher to become proficient.

Teachers at this school worked as teams on several occasions and this too provided opportunities for new teachers to work in tandem with more experienced colleagues. Sheela taught VI standard with a more experienced colleague and in a similar fashion, Mohan taught environment science to the IX standard along with Maya who had been in the school for much longer. Team teaching meant that the teachers had to spend time planning the lesson together. The teacher's workday in this school allowed sufficient time to do this. A rough estimate indicated that approximately half the teacher time at this school was spent in lesson preparation and planning activities. Teachers here had resources like computers to help them in lesson preparation.

Sheela also spoke about the different levels in which teachers found support in the school. She mentioned support at the department level, (referring to the organisation of the teachers into subject departments), support from colleagues, and support at the school level (in terms of regular trainings and workshops) and also support from parents. She mentioned that parent feedback was helpful in providing pointers to areas in which she needed to

improve. There was an active involvement of parents who offered voluntary support to classroom teaching in various ways, such as coming in and speaking to children about their work if it was relevant to the classroom lesson, or organise exposure visits for the students, or providing information resources related to some curricular topics.

Sheela was enrolled for a Diploma in Professional studies programme with the Oxford Brookes University, which was a distance programme of study. Despite having professional teacher education degrees, Meena and Maya were also enrolled with Cambridge and Bath Universities respectively in distance education programmes for professional development. In general, teachers in this school opined that the B. Ed training that they had undergone was *"bookish"* and they found *"hands on"* training of the kind they received in the school quite useful. Since the curricular emphasis in the school differed significantly from that in the government and private schools, it was important for the school to ensure appropriate orientation and skill development for its staff. Towards this end, the school actively set up in house training and peer support for its teachers and also encouraged them to further their professional development in directions desired by the school by offering teachers loans to enable them to enrol in professional courses offered by universities abroad.

6.3 STUDENT-TEACHERS

During the study, it was possible to observe episodes of student-teachers coming for their teaching practicum in the some of the schools, namely, GBP, GAH and PU. It was also possible to interact with student-teachers from both the pre-service streams, D. Ed and B. Ed and also with some teacher educators who had come to supervise or examine the student-teachers.

The three D. Ed student-teachers who were respondents in this study were studying in private teacher training institutions (TTI). Two of them, Ghousia and Harish Prasad had come to the government primary school, GBP, for their internships in the second year of their D. Ed programme. Both these student-teachers were from a private TTI in Rajajinagar, Bangalore, West Point TTI (name changed to maintain confidentiality). The third D. Ed student who was a respondent in this study was a student of the Teachers' Training College run by the Tunga Trust.

The Tunga Trust has been briefly described in chapter 3 as it was managing the Tunga Public School, the private unaided school (PU) that was one of the sites for this research study. The Teachers' Training College run by the Tunga Trust was in the same leocality as the school, but housed in a separate campus. This College offered both the D. Ed and the B. Ed programmes. B. Ed student-teachers from this college who were respondents in this study were observed during their teaching practice. Five of these B. Ed

students were doing their teaching practice in PU and one of them in the government high school, GAH, in the nearby locality.

Thus the D. Ed student-teacher respondents in this study were from two different private TTIs and the interaction with them took place during their practice teaching at GBP or PU. All the B. Ed student- teacher respondents were from the Teachers' Training College run by the Tunga Trust.

TABLE: 6.1: STUDENT - TEACHERS

S. No.	Name	Sex	Resident of	Programme	Teacher Education Institution	Subject	School (site for practice teaching)
1.	Ghousia	F	Bellary	D. Ed	West Point TTI, Rajajinagar	English, Science	GBP
2.	Harish Prasad	M	Gulbarga	D. Ed	West Point TTI Rajajinagar	English, Science	GBP
3.	Prashant	M	Tamil Nadu	D. Ed	Tunga TTC	English, Science	Tunga Public School (PU)
4.	Madesha	M	Gulbarga	B. Ed	Tunga TTC	History, Kannada	GAH
5.	Babu Lal	M	Rajasthan	B. Ed	Tunga TTC	Biology, Chemistry	Tunga Public School (PU)
6.	Aruna	F	Bangalore	B. Ed	Tunga TTC	English, S.St	Tunga Public School (PU)
7.	Usha Rani	F	Bangalore	B. Ed	Tunga TTC	Physics, Chemistry	Tunga Public School (PU)
8.	Lalitha	F	Hasan	B. Ed	Tunga TTC	Physics, Math	Tunga Public School (PU)
9.	Geetha	F	Hasan	B. Ed	Tunga TTC	Physics, Math	Tunga Public School (PU)

6.3.1. D. ED STUDENTS

In July 2007, during observation at GBP, the researcher had an opportunity to interact with two second year D. Ed student-teachers, who had come for their internships. Both these student-teachers were studying in a private institution, West Point Teacher Training Institute (name of the institution has been changed to maintain confidentiality). One of these students, Ghousia, had come from Bellary. She had come to Bangalore for her teacher training after completing her PUC with History, Economics, Political Science and Sociology from P.U. Arts College, Marimannahalli in Bellary District. For her D. Ed, she had chosen to take English and Science as her pedagogy subjects. It was not required for D. Ed students to have studied science at the higher secondary (PUC) level to opt for teaching the subject at the higher primary level. Ghousia said that she had not got the opportunity to choose science at the PUC level, since there was no science college near her village. In Bangalore, she was living in a hostel. Ghousia also explained that on joining D. Ed, students had to take an exam in the content of their teaching subjects. They were expected to know the subjects at the VII standard level. She said that classes had not been held for these subjects at West Point TTI. During a visit to the Tunga Teacher Training College, this researcher was informed that the college did not hold classes in content areas in the first year of the D. Ed course since the students were expected to be proficient in the content areas. It was also pointed out by the college administrator that

admissions were not finalised by the Central Admission Cell of the DSERT until the end of the first semester thus making it difficult for the colleges to hold regular classes for a cohort of students in the first semester of the course. The D. Ed course has been explicitly designed to teach content areas in the first semester of the course, but West Point and Tunga D. Ed institutions were not doing this. Ghousia and Harish Prasad, also a student of the same D. Ed College, had come to GBP for their internship which was part of the second year of the D. Ed programme. Harish Prasad had completed his PUC from a government first grade college at Doddaballapur and had enrolled for the D. Ed programme at West Point TTI subsequently.

The third D. Ed respondent in this study, Prashant, from Krishnagiri district of Tamil Nadu, was studying in the first year of D. Ed at Tunga Teachers' Training College run by the same trust that ran Tunga Public School (PU). Prashant explained that the donation for getting a seat in a private D. Ed college in Tamil Nadu was Rs 1.5 lakhs and that was the reason he had enrolled in this private D. Ed college in Karnataka. Prashant had completed his secondary and higher secondary schooling from the government high school in Krishnagiri in Tamil Medium. His father was working as a telephone exchange operator in Mandya, Karnataka. Prashant had come to Tunga Public School for his block practice teaching as part of the first year D. Ed course at the time of this research.

6.3.2. B. ED STUDENTS

The Tunga Teacher Training College had B. Ed students from Uttar Pradesh, Rajasthan, Tamil Nadu, Andhra Pradesh and Kerala, as well as Karnataka.

During the first month of field observation, in August 2006, at PU, a group of men and women in uniform had come into the principal's office in the morning while this researcher was talking with the principal. They requested him to sign their assignment books. After looking into one or two books, the principal asked them to copy from their friends who already had their books signed and then bring it. When the B. Ed students explained that it was the last day for getting his signature, he said that he would be in his office till 4:30 p.m. He tried explaining to the students in Hindi what he wanted them to do and again repeated his injunction for them to copy from their friends. After the group left, the principal explained to the researcher that these students were from U.P and language was a problem for them. When the researcher asked him about the reason for Hindi speaking students to study in Bangalore two reasons were mentioned by him:

i) These students were able to pay substantial donations for getting a seat in the college. The college needed the money, as the management had to pay heavily for permissions and also during inspections;

ii) The education in Bangalore was better because "our students learn English from the third standard. In the North they have only one language till the V standard."

The principal was suggesting that these students preferred to study in Bangalore to avail better quality education.

During a brief interaction with two male B. Ed students from Rajasthan, this researcher learnt that they had not passed in the selection test for B. Ed seats in Rajasthan and there were no private B. Ed colleges there. The situation has changed since then, with the opening of several private teacher training colleges in Rajasthan from 2005 onwards. One of the students, Babulal Yadav, mentioned that of his friends, who did not get selected for the B. Ed in Rajasthan, some had gone to J&K for their training and some had come here, to Bangalore. He mentioned that he had paid Rs 80,000.00 to the college for the course and the amount covered his hostel charges also. When asked what his plans were after B. Ed, he said he would appear for the selection examination for teacher recruitment in Rajasthan and if he did not get through, he would take up teaching in some private school.

Madesha, another student who was studying in the B. Ed programme at the private teacher training college, run by the Tunga Trust, was a graduate in humanities from Gulbarga and had come to the government high school (GAH) for his 'final lesson' which was to be graded. He had completed his

block teaching practice at the same school along with other B. Ed students from the Tunga Teacher Training College which was nearby. Kannada medium students from this college were sent to the government school, GAH for their teaching practice, whereas the English medium students and science students who could communicate in English were sent to Tunga Public School (PU) or other nearby private English medium schools for their practice teaching.

Aruna, a Bachelor of Arts, was another student from Tunga Teacher Training College, who had taken English and Social Studies as her teaching subjects. She had come to Tunga Public School for her practice teaching along with four other student-teachers. These four students had opted for science as their teaching subjects.

The four B. Ed student-teachers who had opted for science and/or math were Lalitha, Geetha, Babulal Yadav and Usha Rani. Both Lalitha and Geetha were fresh out of college and had studied in government-run institutions in Hassan district of Karnataka. Babulal too had studied in a government school in Rajasthan and then completed his degree from a private college. He had decided to try for a teaching job after not finding suitable employment elsewhere. Usha Rani had been interested to join engineering but did not score high enough in the entrance examination, and therefore had gone on to complete her B.Sc degree. After her degree, she had joined a computer course for three years and then after getting married, had decided to do her B. Ed with

a view to taking up a job as a teacher. Of the five B. Ed students who were respondents in this research, she appeared to be the most confident.

6.4 PRACTICE TEACHING

As discussed, the two year pre-service teacher preparation curriculum for elementary teachers formerly called TCH, was revised in 2000-01 and renamed as 'Diploma in Education' (D. Ed). The D. Ed curriculum at present includes two blocks of school practicum in the first year and two such blocks in the second year. The students were expected to do one month of teaching practice in the first year of the D. Ed course and three months in the second year. Ghousia and Hari Prasad, the two second year students were observed during their second year practicum block at GBP. During this block, D. Ed students were required to teach in schools continuously for a period of three months.

The ten- month B. Ed programme of Bangalore University was shorter than the D. Ed programme and prepared teachers to teach two subjects at the secondary level. The entry level qualification for this programme was a graduate degree. The B. Ed programme was divided into two semesters. In the second semester, each student was expected to teach a total of 24 lessons, comprising of 12 lessons in each subject. In addition to teaching these lessons, student-teachers had to observe 80 lessons taught by their peers. Student-teachers had to maintain detailed lesson plan records as well as records of the lessons observed by them. The practice lessons of the second semester B. Ed

students were observed at Tunga Public School (PU) and at GAH. Practice teaching of D. Ed students was observed at one of the government primary schools, GBP

During practice teaching student-teachers had to go to schools and teach lessons. In the case of D. Ed, the lessons were not rigidly planned and these student-teachers were expected to engage primary classes as per the contingent requirement of the school in which they were doing their practice teaching. In the case of B. Ed students, the number of lessons that they had to teach as well as the way in which they planned and delivered these lessons were prescribed by the Bangalore University syllabus.

6.4.1 D. Ed Teaching Practice by Second Year Students

During the internship period in the second year of the D. Ed course, student-teachers were expected to teach classes in the allotted primary school for a period of about three months. The primary schools for practice teaching were selected on the basis of convenience by the management of the TTIs and were invariably located in the vicinity of the TTI.

At the higher primary school, GBP, two D. Ed students from a private teacher training institute had come in the month of July to complete the required three months of teaching practice. During the visits to the school by this researcher in the period July-September 2007, there was no supervisor from the West Point TTI present. The teachers at the school mentioned that no one from the college came to check on the student-teachers.

The following incident was recorded by the researcher on 2 July 2007 and it was the first occasion when the two D. Ed students had come to GBP for their second year teaching practice.

Practice 1, GBP

The first classroom on the ground floor of the school building had the VII standard children copying quietly from the board and there was no teacher in the classroom. The next classroom had VI standard children also copying in their notebooks and here too, there were no teachers. Three of the regular teachers were together in another classroom, sipping coffee from tiny plastic cups, while a boy who had come from a rural area was being made to read a book to see whether he could join the VII standard. There were no students in this classroom. Upstairs on the first floor, one of the D. Ed students, Harish Prasad was standing with a stick in hand, while children copied from the blackboard. In the next classroom there was no teacher, but children of V standard were writing English words for the pictures in their textbooks. English was introduced for the students for the first time in this standard. The textbook had pictures to familiarise student with the names of various things in English, rather than have them write words like 'telephone' or 'chocolate' before they had learnt the initial letters and sounds of the written language. Ghousia, the D. Ed student entered the class and on noticing the researcher in the classroom, Ghousia the D. Ed student offered this explanation, *"The other class had no teacher, so I gave these children homework and went to that class. Since you are here I will again go to that class."* She went back to the other class, while this researcher began interacting with the children.

Homework in this case meant written work and that was a fairly common usage; most teachers used the term 'homework' when they meant written work, which mostly meant copying. This strategy was employed to keep the children occupied and quiet.

The episode described above was on the first day of Ghousia's three month teaching practice. Later, while interacting with the researcher, Ghousia said that she had spent the whole morning completing various formalities and was expected to take whatever classes the regular teachers asked her to take. Upon asking what the student-teachers were expected to do during internship,

they said that they had been told by their lecturers in the TTI to take whatever substitution classes were allotted to them.

During the incident on 2 July 2007, this researcher experienced considerable anxiety when left in charge of a classroom of children whom she had not planned to teach. This was in spite having a number of years of experience as a teacher at both primary and secondary levels. Perhaps, this led to the researcher asking Ghousia whether she was anxious about her practice teaching at GBP since she may have to handle more than one class simultaneously without any supervision or even assistance from more experienced teachers. She said that she was not particularly worried about this.

In the case of Tunga Teachers' College, in the month of July 2007, this researcher was able to meet a lecturer from the D. Ed section who had come to Tunga Public School where some of the D. Ed students were placed for practice teaching. This lecturer mentioned that she made it a point to be present at the school for about two hours each day during the internship period to ensure that the student-teachers were present in the school. She said that she tried to spend some time during her visit to the school to discuss lessons that had been taught by the student-teachers. She however did not observe the classroom teaching of the student-teachers. This lecturer mentioned that she was also expected to visit another school where more student-teachers from the Tunga Teachers' College were doing their internship. The student-teachers were allotted periods to teach whenever a regular teacher was absent or unable

to take a class. These classes were not observed by teacher educators or the regular teachers. When this researcher asked the D. Ed lecturer about practice teaching, she said that there was no fixed plan for teaching and that student-teachers were supposed to take whatever periods they were given by the school as substitutes for teachers on leave or otherwise busy. This researcher was able to observe only three lessons taken by three different student-teachers at Tunga Public School. Two of these lessons were English lessons. In one of the lessons, the student-teacher made the children read a lesson out. A child would be asked to read a part of the lesson and then after a few sentences the teacher would point to another child who had to continue from where the previous child had stopped. After the lesson was read, the children were made to write out the spellings of some words from the lesson. In the other class, the student-teacher spent considerable amount of time asking all the children to introduce themselves in turn and then proceeded to give the children a list of antonyms to copy from the board. In the third lesson, the student-teacher was substituting for a science teacher, but rather than teaching science she asked the children to take out their General Knowledge book and quizzed them from it.

The instruction about practice teaching given to D. ED student-teachers from both the private colleges, West Point and Tunga were similar as student-teachers from both these institutions had been told to be present in the schools allotted to them and take whatever classes that were given to them.

However, lecturers from Tunga Teachers' College visited the schools where their students were placed for practice teaching unlike lecturers from West Point. The understanding about practice teaching of D. Ed students during the internship period was that it did not have to be supervised and that student-teachers would manage their teaching by taking whatever periods were allotted to them by the concerned school. The D. Ed lecturer from Tunga College mentioned that she felt the need to discuss lessons with the student-teachers because they were sometimes at a loss about handling children and so she gave the students tips about this. She said that unlike B. Ed students, D. Ed students did not have to make elaborate lesson plans and maintain lesson plan records. They merely maintained a list of the classes that they had taught in a note book. During field visits to Tunga Public in this period, the researcher had also briefly met students from another private D. Ed college who had come there for their internships. These students said that no lecturer from their college came to supervise their school visits. The D. Ed lecturer from Tunga Teachers' College thus seemed to be an exception to the norm of allowing students to do their internship largely unsupervised.

D. Ed students did not seem to have a requirement for teaching aids or lesson plans and the expectation was that they would manage classes as and when required by the principal of the school. D. Ed students were not supervised or mentored during their practicum, although the D. Ed lecturers from Tunga Teacher Training College did take turns to visit the schools where

their D. Ed students were doing their practicum. At Tunga Public School, the D. Ed students were given a small room next to the principal's office for their use. During field visits to the school in the months of July and August, 2007, this researcher did not see much interaction between student-teachers and regular teachers of the school. The faculty from the teachers college also did not interact very much with the staff in the school and communicated mainly with the principal to schedule the practice classes for the trainee teachers. Unlike the elaborate lesson planning exercises that were required of the B. Ed students, there was no such requirement from the D. Ed students. They maintained a simple log of the classes they had taken during their day in the school. They classes given to these students were *ad hoc* and seemed to preclude any serious planning of lessons on the part of the D. Ed students.

6.4.2 PRACTICE TEACHING BY B. ED STUDENTS

In July-August 2007, the B. Ed students had their two months of block teaching at Tunga Public School. The principal suggested that I could observe their classroom teaching and that it may be useful because the B. Ed students would follow all the *'steps'*. He elaborated what he meant by steps:

"Steps of lesson – introduction, use of models and charts, body of lesson, conclusion, recapitulation questions and evaluation. They will take only a small portion and teach. They have to do through steps."

The B. Ed students and their lecturers had the use of a small room next to the principal's office. They were required to prepare and deliver 25 lessons over the next two months and these would all be observed, assessed and evaluated as part of the internal assessment. Each lesson had first to be planned in fairly elaborate detail in a fixed format and while teaching the lesson, students were not expected to deviate from their plan. Teaching aids, invariably in the form of charts, had to be used while teaching. The researcher was able to see students absorbed in going over their lesson plan, sometimes sub-vocalising the key points and questions as they memorised these as part of their preparation to deliver the lesson. One of the trainees, Aruna, who had chosen Social Studies and English as her teaching subjects, said that their lecturer insisted that the classroom teaching stay close to the lesson plan. She had said that even the evaluation questions had to be the same and asked in the same order as written in the lesson plan. This was mentioned by Aruna by way of explaining her anxiety about teaching the lesson and also the reason why she was trying to commit the evaluation questions to memory. She did not want to get a negative feedback from the lecturer who would be observing her class. She said, “I am not mugging, but have to remember these questions in the same order, or he will say something afterwards. Even in school, I studied in Kendriya Vidyalaya, I never mugged. I always understood. I find mugging difficult.”

Usha, another B. Ed student opting to teach physics and chemistry, while copying lesson observation sheets of a fellow student, said that they had to give 25 lessons and also observe 80 lessons delivered by their peers. Since this was not always possible, students often copied each other's observation sheets to make up the requisite number of observed lessons. The rationale for peer observation was for student-teachers to be able to critique and provide feedback to each other about teaching in accordance with the methods taught during B. Ed. The peer observation was recorded on a single sheet under the following heads:

- Introduction
- Statement of aim
- Development Stage
- Recapitulation
- Home Assignment
- General Observation

Presented below is an extract of a lesson taken by Babulal Yadav (BY), a B. Ed student from Rajasthan. He had prepared to teach a lesson about microorganisms to IX A section. They had already been taught the lesson by their regular teacher.

Pracitice 2, PU

Before the lesson commenced, the students of IX A were moving out of the class towards the playfield. Only a few girls were inside the classroom talking to each other in a small circle, when the B. Ed group walked in. The B. Ed lecturer and nine other B. Ed students, six men and four women, all carrying observation notebooks, waited at the door. Some girls walked back into the classroom and then called out to their class mates in the corridor, *"Ae it is B. Ed class, we have to be here."* The B. Ed students took their places on the benches at the back of the class, as the school students continued to trickle back into the class talking amongst themselves. The B. Ed lecturer sat on a plastic chair right at the back, behind everyone else.
Appearing a little nervous, BY took his place in front of the students, then walked to the blackboard without saying a word to the students and wrote:

Subject : Biology
Topic : Microorganisms

Next he proceeded to vertically partition the black board into three columns by drawing chalk lines on it. The left and right columns were narrow, while the central column was much wider. Having done this, BY paced across the front of the classroom a few times, and then with his head turned partly towards the window, asked the students if they knew the names of the different micro-organisms. Students responded by taking turns to name the different microorganisms and as they named the organisms, BY wrote them in the central column on the blackboard.

Virous
Protozon
Algi
Fungi
Bacteria

(All the words have been spelt as they were by the student-teacher BY)
BY: What are disease caused by virus?
Students (in chorus): Small pox, common cold.

BY paced up and down across the front of the class a few times and then continued.
Students were quiet and did not converse much as BY paced across the front of the class a few times. A few students here and there talked among themselves in very low voices.
BY: Now we will study about the bacteria.

After a pause, he wrote in the left column of the blackboard

Meaning of bacteria

Structure of bacteria

Having written this, BY held up a hand drawn chart of a bacterial cell, mounted on a piece of cardboard with a decorative border. The writing on the chart was too small to be seen from the back of the class.

BY (recitation like): Bacteria has two layers, cell wall and cell membrane.

The diagram on the chart had these two layers shown in different colours and BY pointed them out. The elliptical outline of the bacterial cell was filled with red spots and at the centre was a smaller ellipse, shaded blue. BY pointed to this area and the students said that it was the nucleus. BY corrected the students.

BY: Not nucleus, it is nuclear region with genetic material.
Students (several speaking at the same time): DNA, DNA.

BY placed the chart on the teacher's desk and then drew the bacterial cell again on the board. He pointed to various parts and as the children named the parts he pointed to, he proceeded to label them.

BY: See this is nuclear region. Bacteria not have other organelles. Nucleus, mitochondria it is absent. The ribosome is only organelle in bacteria. Bacteria move with help of (pause) flagella and cilia.

Girl: Sir, what is the difference between flagella and cilia?

BY drew another diagram on the black board to show the difference between cilia, which he had drawn as short lines emanating from the bacterial cell wall, and the flagellum that he drew as a single wavy line. He did not offer any verbal explanation – just pointed to the diagrams and said the words 'cilia' and 'flagella' while pointing to these.

BY: Draw (Instruction given to class)
Only two or three children drew in their notebooks, while the majority of them just sat silently.

He stepped off the teacher's platform briefly, glanced at students seated in the front row, without appearing to look at their notebooks. Then he got back and proceeded to erase what he had drawn.

BY then spoke about useful and harmful bacteria and gave examples of each. Since students were familiar with this lesson they could respond to BY's questions, such as "which are useful bacteria?" without BY having to explain

or teach about these. BY then moved on to disease causing bacteria and listed the symptoms of tetanus and cholera on the board.
BY (to students): Write it. I check you [sic] notebooks.

After saying this, BY paused for a few seconds and then erased the board. Many children did not write in their notebooks. The lesson till now had taken 15 minutes to transact.

BY: What is size of bacteria?
Students: 10 microns
BY: Name of genetic material?
Students: DNA
BY: Which organelle is present in bacteria cell?
Only one student, a boy, had his hand up and BY nodded in his direction.
Boy: Lysosome
BY: Ribosome
BY: Who is father of bacteriology?
No response.
BY: Leeuenhoek. Quickly, quickly write down, after class I will check your notebooks.
BY: Homework.
BY wrote the homework questions on the right hand column of the blackboard.

1) Draw a neat diagram of bacteria and label it?
2) Which bacteria convert milk into curd?
3) Which material is genetic material in Bacterial cell?

BY: All are write no?
Students (lazily): Yes sir.
After a pause of about a minute, BY erased the board.
Girl: Sir, I have not written sir.
BY: Why?
BY (pacing the floor): You will complete your homework (Pause) complete your homework. Any doubt?
Students: No doubt sir.
BY: After, I take your test in this lesson.

The lesson was completed in 25 minutes and the B. Ed supervisor left the classroom, followed by the other B. Ed students. BY stood behind the teacher's desk and a few boys went up to him and started talking.

The 'steps of lesson' were clearly visible in this transcript. BY began with the introduction which he did through questioning the students about their prior

knowledge about microorganisms. The next step was "Statement of Aim". BY did this by stating "Now we will study about bacteria." This was followed by the "Development Stage", during which charts and blackboard work was used to give information about the structure of bacteria. After this step, BY asked a few questions about bacteria as part of the "Recapitulation" and finally wrote down questions for "Home Assignment". BY's unfamiliarity with English was also evident in his sentence phrasing, spelling errors and minimal use of explanatory sentences while presenting information to the class. The questions asked by BY during the "Recapitulation" stage did not pertain to the information that he had given in the class. Had the students not been familiar with the contents of the lesson they would not have been able to answer the questions on the basis of the lesson transacted by the student-teacher. This aspect was not seen as worthy of comment by the supervising teacher-educator when he met the student-teachers later for feedback and discussion.

During the "Recapitulation" stage of the lesson, Babulal asked questions about size of bacteria, bacterial cell organelles and the "father of bacteriology". The actual instruction during this lesson did not deal with this information; therefore, the questions were not actually seeking to help students recapitulate what had been taught in this particular lesson.

6.5 FEATURES OF PRACTICE TEACHING

Based on the observation of 22 practice teaching lessons in three schools (GAH, GBP and PU); interactions with student-teachers; and interactions with

teacher- educators, the following features were identified as key constitutive dimensions of the experiences of the B. Ed and D. Ed students during practice teaching:

- Managing discipline in the class
- Insulation of practice teaching
- Practice teaching unlike real teaching
- Delivering the lesson vs teaching the subject

6.5.1 MANAGING DISCIPLINE IN THE CLASS

Sarangapani (2003: p.101) wrote, "... teachers, children and the community shared beliefs about the nature of childhood and growing up, which seemed to support the centrality of 'discipline' in the process of schooling." This was borne out by several instances observed and experienced by this researcher.

In a rather amusing instance, when this researcher was left in charge of a class which was noisy and boisterous, a boy, perhaps taking her to be a novice teacher, said. *"You should say aiy, miss"*. Then he handed the researcher a stick, saying, *"You should hit them miss, if they don't stop making noise."* In another instance, when several teachers were absent, the Headmistress had gladly accepted the researcher's suggestion that she take the V Standard English class. The only way the class got on with a semblance of order was when the researcher picked up the stick lying in the corner. Later the Headmistress, remarked, *"No matter what your training has told you, these children will make you take up the stick!"* In the first instance, the

students had assumed that the researcher was an inexperienced or novice teacher and proceeded to show her the way regular teachers exercised control. In the second instance, the Headmistress made a reference to the researcher's training for teaching and indicated to the researcher that actual classroom practices require different strategies from those taught during training. Both these experiences indicated the centrality of the teacher's authority in maintaining discipline. This was the ethos in the school and the student-teachers need to be socialised and enabled to acquire the skill of controlling students.

At the government school and the private school, B. Ed students coming in for practice teaching were an annual feature. Gayatri (GAH) and Sharada (GAH) took action before student-teachers started their teaching by warning the school children to be on their best behaviour and threatening them with severe punishment should they misbehave during the lessons taught by student-teachers. When asked why they felt the need to do this, they said that many student-teachers found class control a problem and if the class was very unruly, the regular teachers would have been reprimanded by the Head mistress for not inculcating appropriate behaviour among their students. Gayatri also explained that since teaching practice would continue for a few weeks, she did not want her class to develop lax habits and become undisciplined as a result of student-teachers' inability to maintain discipline in the classroom. She also expressed sympathy for student-teachers saying,

"They will lose marks in their final lesson, if my class gets too naughty." Gayatri however, did not directly interact with student-teachers to help them manage the class, but used certain strategies described below as a prophylactic measure to ensure that her class did not lapse into unruly behaviour as a result of prolonged exposure to inexperienced teaching at the beginning of the school year.

In July 2007, about a month into the new academic term, Gayatri was in the VIII standard classroom. For the students, this was their first month in high school. Gopal who was the class leader in VII standard at primary school had assumed leadership in this class too. On this particular morning, he had already complained to Gayatri about some of the boys who he said were being noisy. Gayatri, instead of taking her place at the front of the class had positioned herself in the space between the boys and girls, somewhere in the centre of the class. She turned towards the girls and presumably addressing the two girl leaders in the class said, *"If anyone talks too much or makes noise hit them across the mouth."* Gopal said, *"If we hit them, they will hit us back."* Gayatri spoke of how it was important to maintain discipline in the class and that new B. Ed teachers would be coming and cautioned the students saying that they would "get it" if they created a disturbance. She then told the class that for the next fifteen days she would keep four sticks at the back of the class and that the leaders should hit anyone who dares to make a noise. When a boy

complained to her about his neighbour being naughty and flashing a light, Gayatri went up to the alleged offender, pulled his ear and hit him.

Till this episode, transcripts of Gayatri's lessons had not shown her to be particularly authoritarian. She usually spoke in pleasant tones to the class and did not normally threaten or use the stick. This episode presumably occurred because it was the beginning of the year and the norms of the classroom had to be established. During discussion after the class, Gayatri mentioned that she was worried that if the B. Ed students did not control the class, the students would become unmanageable later. She also effectively established the authority of the leaders who would then proxy her role in her absence. During practice lessons taught by the student-teachers if the class got too unruly, Gopal or Suma Rani (the class monitors) would threaten to note down the names of the misbehaving students and report them to Gayatri teacher and this had the effect of restoring quiet in the class allowing the student-teacher to proceed with the lesson.

Sharada, who was an external examiner for the B. Ed students, felt that the student-teachers may fare badly during their practical teaching exam if they could not control the students. The following incident occurred in the final week of teaching practice when student-teachers were to deliver their "final lessons" and be evaluated. A few of the B. Ed students had complained to their B. Ed lecturer about their problems in controlling this class and he had spoken to Sharada about this. Sharada as the external examiner had been

observing their classes. She called in Madesha, a B. Ed student-teacher of Tunga Teachers' College who had to take a lesson in the IX A standard classroom. The ninth standard students were already seated in the class, talking among themselves. Without allowing the students any time to settle down, she called out four boys to the front of the class and grabbed each one by the hair and hit them on the head, saying, *"These are the trouble-makers! Now let us see what they do!"* Having thus more or less shocked the class into silence, she asked the B. Ed student to start his lesson. Sharada had effectively demonstrated to the student-teacher a rather drastic way of achieving class control. Her own explanation for her action was that she wanted to show the B. Ed student how to control the class and not resort to complaints and excuses for not performing well during the practical teaching examination.

At GBP, while trying to manage two classrooms, Ghousia came back to the standard V class. She had left the class un-supervised for some time after assigning the children a writing task. When she came back, children began to move around and noisily asked her to look into their books or notebooks. Ghousia had gauged the children's differing abilities and assigned some children the work of copying a few alphabets, and for others the work of writing the words for the pictures in their textbooks and for still others the work of copying rhyming words that she had written on the blackboard. When the children's clamour became a bit too much she raised her own voice and said, "Those who are not silent are…" The chorus response was "Bad boys!"

Then she said, “Those who sit silently are…” and this time the chorus was less distinct but sounded like “Good boys.” This chant did not seem to make much difference to the student's behaviour, but was an attempt by Ghousia to quieten the children by reminding them through a ritual about what sort of behaviour was desirable. The desirable or good students were explicitly identified as the quiet or silent students.

During the B. Ed practice teaching at Tunga Public School done by either of the two student-teachers Lalitha or Geetha, a third student-teacher Usha Rani often took an active role in ensuring class control. If the children in the class started talking to each other while the lesson was in progress, Usha Rani would stand up from her observer’s seat at the back of the class and threaten to make those who were talking stand up on the bench. At other times, the B. Ed lecturers provided this support to the B. Ed students by threatening to report noisy or talkative students to their principal.

The implication of such incidents was to establish the primacy of the teacher’s authority in the classroom. In order to deliver the lesson effectively, the teacher had to ensure that students were silent unless specifically asked to respond to questions. The teacher was also expected to control student movements and actions and one of the marks of good teaching was the ability to make students remain silent and stay seated.

6.5.2. INSULATION OF PRACTICE TEACHING

At Tunga Public School (PU), there were very few interactions between regular teachers and student-teachers. The faculty from the teachers' college institutions made arrangements for their students' practice teaching by seeking permission from the head of the concerned school. The student-teachers went to the school in a group and mostly seemed to keep to themselves. They were not required to observe the teaching of regular teachers or discuss their lesson plans with them. The regular teachers in turn did not observe the teaching of the student-teachers. Their interaction with the student-teachers was mainly limited to telling them the periods in the day which would be made available for the practice teaching and indicating the chapters that had already been taught and those that were yet to be taught. As already mentioned, the regular teachers did not take into account the lessons taught by the student-teachers while planning for their own teaching. High school science and math teachers at Tunga High School resisted giving up their periods for practice teaching and made arrangements with the sports teacher or the computer teacher to make their periods available for student-teachers.

In the case of the government high school, GAH, which was also a site for practice teaching for B. Ed students from the nearby Tunga Teachers' College, it was observed that only Kannada medium students who had opted to teach Kannada and History were allotted this school. When asked about this, the faculty from the college mentioned that B. Ed candidates who had

opted to teach science were allotted English medium schools for their teaching practice.

When the B. Ed students came for their teaching practice, the regular teachers at GAH utilised their time to catch up with administrative work and did not observe the practice teaching or interact with the student-teachers. Gayatri's warning to her class to behave during the lessons given by the student-teachers was done prior to the weeks of practice teaching. She mentioned to this researcher that she was planning to take some time off when practice teaching was going on, since most of the periods would be taken up by the student-teachers.

During the three weeks that B. Ed students were a regular feature at the school the teachers grumbled that their classes suffered and that later they would have to race to cover the portions in time for the annual examinations at the end of the school term. During field visits to GAH in July, August 2007, this researcher often saw B. Ed students in their distinctive uniforms moving across the school grounds carrying charts and proceeding towards the classes. These student-teachers did not approach the regular teachers in their staffroom. Sharada, the regular teacher at GAH who had been appointed as external examiner for the B. Ed practical examination confined her interactions with the student-teachers to the evaluative observations that she made when the students were giving their "final lessons".

It has already been noted how the two D. Ed students from West Point TTI, who had come for their internship to the government primary school, GBP were not mentored or supervised. Here too, like in the case of GAH, the regular teachers took the opportunity to catch up with other chores while practice teaching was in progress. Thus they did not interact very much with the student-teachers. In the case of D. Ed students doing their internship at Tunga Public School also, there seemed to be rather limited interaction with the regular teachers.

The D. Ed and B. Ed students who came to Tunga Public School for their teaching practice had a separate room where they could sit and prepare for their teaching practice. Since they did not utilise the staff rooms provided for the regular teachers, student-teachers had very limited opportunities for informal interaction with them. On a few occasions, when the B. Ed science students sat in the staffroom used by the secondary school teachers, they kept to themselves and seemed to be mainly pre-occupied in completing their lesson plans or observation records.

These observations indicate that the official teacher preparation curricula do not provide opportunities for student-teachers to learn directly from more experienced teachers. The underlying assumption here seems to be that experienced teachers have little to offer by way of skills or knowledge to student- teachers and also that the practical skills of teaching can be acquired in the course of practice teaching without much effort. This assumption seems

to be held especially in the case of the D. Ed course where the student-teachers are not required to carefully plan and reflect on the lessons to be taught by them.

Lessons taught during practice teaching were not expected to seriously feed into students' understanding of the subject being taught. The regular teachers took the responsibility for teaching the lessons and did not think it was wise to allow the B. Ed students to take real responsibility for teaching any lesson. When explicitly asked about this, the regular teachers said that they would not trust the B. Ed students to adequately teach the content. The B. Ed students were invariably allotted periods that were otherwise used for activities like physical training, games, library or music and were not allowed to take over periods from the concerned subject teachers. The children, in turn, were clearly aware that the B. Ed teachers were not to be taken seriously and did not write in their notebooks during the practice teaching periods even when explicitly told to do so. If the B. Ed teacher insisted on the students writing, then they would do so in their 'rough note-books' and not in their subject note-books. The B. Ed practice teaching lessons were taught in addition to rather than in lieu of the same content taught by the regular teachers. In the case of the D. Ed students who took periods as substitutes for regular teachers, no discussion or coordination took place between the in-service teachers and the student-teachers to ensure continuity in teaching and

learning for students. Thus, practice teaching in both D. Ed and B. Ed levels remained isolated from regular teaching.

The faculty from the teacher training colleges also did not observe the teaching of in-service teachers and only interacted with them on matters concerning schedules for practice teaching. This meant that the everyday practices of in-service teachers were considered of little relevance to the teacher preparation programmes. Conversely, such insulation between in-service and pre-service teachers also meant that in-service teachers did not have occasions to reflect on the relationship between their practice and the knowledge of teaching that was being transmitted in the teacher preparation programmes.

6.5.3. PRACTICE TEACHING IS UNLIKE NORMAL TEACHING

The idea that the B. Ed practice teaching was not like the normal teaching seemed to be widespread, and was held by the B. Ed students, the practicing teachers, the B. Ed faculty and the school students. The common perception about the B. Ed training was that it upheld a somewhat fixed method of conducting a lesson (generally applicable across all subjects), and was too idealistic to be relevant to the actual teaching situations confronting the teacher. Section 6.2 of this chapter provided a window into how in-service teachers viewed B. Ed training. Several of them explicitly stated that their everyday teaching practice did not resemble the way they were taught to teach during their B. Ed training. A similar view was explicitly noticeable in the

statement made by the principal of the private unaided school (PU) to this researcher. After advising the researcher to observe the B. Ed students' practice teaching, he added, *"Here our teachers don't teach like the B. Ed students. It is not practical to use steps every day. The portions will not get completed if the teachers strictly followed the B. Ed method."*

It has already been noted that regular teachers at Tunga Public School did not consider the lessons taught by the B. Ed students to be valid and would invariably teach the same content to their class regardless of whether it had been taught by a student-teacher. Students also did not take the lessons taught by the student-teachers seriously. At GAH, several high school boys had chosen to remain absent from the school during the practice teaching month. In response to being questioned about their absence by their class teachers, the boys had said that there had been no *"real teaching"* over the past two weeks as it was only the B. Ed students who had been taking classes. This incident occurred when the researcher was present in the staffroom and was thus able to record it.

On a particular day, during this block teaching period, in July 2007, approximately 30 children from standard VIII were seen, sitting on the school grounds writing answers to questions on a printed form. The rest of the class was inside the classroom, copying some notes under the supervision of the class monitor. On inquiring, the researcher was told that the students who were outside were doing a test prepared by the B. Ed teacher. Since the test

performance was supposed to reflect the efficacy of the student-teacher's teaching, he had chosen only the students whom he considered *'bright'* for administering the test. The underlying assumption here seemed to be that practice teaching during B. Ed was not meant to relate to the actual situation in a classroom, but had to adhere to some idealistic notion of teaching with a corresponding notion of an ideal set of students.

During an interaction, Sharada who had an M. Ed degree had declared that B. Ed methods would not work at the government high school. The main reason she cited for this was the heavy student strength. This is how she explained, *" In the 40 minute period, 10 minutes go if you are the class teacher and have to deal with students' home problems, another 10 – 15 minutes will be lost in taking roll, so remaining 10 or 15 minutes. If you come with some idea, you can't carry it out. If you plan to take them to the lab, there is no lab."*

During classroom observations of regular teaching, it had been observed that teachers did manage 30 or more minutes of actual teaching time, and roll was not taken at every period, also most teachers filled in the attendance register by checking with students about their absent classmates and did not usually utilise teaching time to call out roll. However, one of the justifications given by Sharada for not teaching according the B. Ed, was paucity of time. Vimala had mentioned that *"B. Ed is 50% useful".* When asked what she had found useful in the B. Ed course, she mentioned lesson

planning, identifying the main teaching points that could be taught in the time available and learning to evaluate students. Gayatri felt that her own B. Ed training at Vijaya College really helped her in her profession. She said that what she learnt in B.Sc was different from what she had to teach in high school and that it was while doing her B. Ed course that she actually learnt about teaching.

Through these responses of in-service teachers, it was possible to discern that there was a perception of the teaching method advocated in the B. Ed course as being an ideal that was removed from the real situations that teachers were confronted with in their classrooms. Teachers like Sharada and the principal of Tunga Public School felt that the method followed during practice teaching was too time consuming and that they would not be able to finish teaching the required content if they adhered to the method of teaching through 'steps'.

The pre-service training also had implicit within it, certain expectations of pupil behaviour which were not matched by the way students acted and behaved in the different schools. Several student-teachers had difficulties with managing student behaviour in ways that would allow them to proceed with the lesson as planned. Student-teachers were evaluated on their ability to adhere to their lesson plans and thus no allowance was made for possible differences in students' response to the planned lesson. In-service teachers were clearly aware of the need to manage student behaviour and in the case of

GAH, pre-empted disruptive behaviour during practice teaching by the means already described.

During interactions with B. Ed students, their opinion of the method of teaching followed during practice teaching was sought. Most of the B. Ed students felt that it was not applicable to any great extent to the actual work of teaching that they would have to do once they found employment as teachers. One of the B. Ed students said: "Actual teaching is not like this." When asked to explain, she said, "We will go slower in English. Here we have to stick to the same format, it is too rigid. All the steps we have to do now – recapitulation, evaluation, that and all we won't do. Teachers don't teach like that – with flash cards, and silent reading our lecturer said we should make them do – they won't follow the lesson like that. When we teach really, we will go slow." (The student-teacher was speaking English)

However, the B. Ed students who were teaching science felt that while teaching science and math, they would do it in ways similar to those in their practice lessons. When asked what they would do differently when they did *'real'* teaching, Usha Rani said that she would not make such a detailed lesson plan, and, "We won't waste five minutes in introduction, recapitulation. We will explain more. Here, five minutes we do introduction or recapitulation, five minutes evaluation questions and five minutes homework. Only 25 minutes development of lesson." (The student-teacher was speaking English).

When probed if she did not think recapitulation was important or useful, she said, "No, teachers don't do it. Our teachers did not."

A question to the B. Ed students about the usefulness of doing B. Ed provoked a burst of laughter. Afterwards, one of the student- teachers explained that she and her friends had felt that a lot of what they had been doing as part of their B. Ed training was irrelevant and therefore, they had laughed at my question about the usefulness of the course. During this particular discussion, the principal of the school was passing by and was drawn into the discussion. She emphatically said, "B. Ed type lesson plans are not used by teachers when they are working." When asked whether she as a teacher would not like to help students recall what was done in the previous lesson, she said, "Just one sentence, may be – yesterday we did this and now we are going to do this."

Kumar (2002) wrote that most B. Ed students know before they start teaching practice, and the rest find out within two or three days of starting it, that detailed lesson planning is something done only during the B. Ed training. The interactions between practicing teachers and B. Ed students, though limited, did provide the student-teachers with a glimpse into the work of in-service teachers. They noted that in-service teachers did not spend any time writing lesson plans and spend a lot more time actually teaching as compared to the student-teachers. Unlike regular teachers who were doing the real teaching, the student-teachers' time in school seemed to be mainly

occupied in memorising their lesson plans which functioned as scripts for delivering lessons. They usually had to deliver a single lesson on any given day and had to observe the lessons delivered by their peers. In contrast, regular teachers taught between five to seven periods in a given school day and did not have time for writing detailed lesson plans or for preparing elaborate teaching aids.

One of the girls in IX standard, who had become fairly friendly with the researcher, was asked how well she had understood the lesson taught by a B. Ed student. "We have understood" was her reply. When asked if she would have been able to follow the lesson if this was the first time it was being taught she said, "Yes, we have to somehow get it into our heads." Her initial response to a query about whether she thought there was a difference between the B. Ed teacher and the regular teacher was a guarded, "No". But she qualified it by saying that the regular teacher would have given more information, while the B. Ed teacher just taught from the textbook. She also expressed her understanding of the situation by saying, "They (B. Ed students) will also teach us. They are learning now, so…." This girl was one of the more mature students in her class and was a leader. Her understanding of the situation was that B. Ed teachers were learning to teach and needed to practice and therefore, the students had to sit through the practice lessons, but not really learn anything during these lessons. She said, "Our teacher has already done this lesson, so we have learnt it."

In general, students were aware that practice teaching classes were not to be taken very seriously. This was reinforced by the fact that the teaching periods that were made available for B. Ed practice teaching were invariably periods that had been for sports, music, library or other such periods that could be 'spared' in a sense. The lessons taught by the B. Ed teacher were 'in addition to' and not 'in lieu' of the lessons of the regular teacher. B. Ed students and their lecturers did not consider it necessary to take up the teaching of lessons in consultation with the regular teachers to ensure that the lessons fitted with the overall teaching plan being followed in the school and thus the practice teaching lessons remained outside and isolated from the regular teaching work of the school.

6.5.4 DELIVERING THE LESSON VS TEACHING THE SUBJECT

The practice teaching lessons of B. Ed students of Tunga Teacher Training College were observed by the faculty and also their peers. At the end of a day of practice teaching, the students and their B. Ed lecturer met together to exchange feedback. During this session, comments on a student's lesson were given by fellow students as well as by their lecturer. The lecturer also mentioned how the B. Ed students had to *"follow the steps while teaching".* Feedback was given to different students on various aspects of their lesson delivery. Comments focused almost exclusively on the student-teacher and their instructional styles and there was no acknowledgement of children and their cognitive development or learning needs. If at all children were

mentioned, it was in the context of managing them effectively in order to complete the lesson as per the plan. Deviations from the lesson plan were considered serious flaws and drew severe criticism from the lecturers.

The areas that drew comment could be broadly classified into the following categories:

- Speech, mannerisms and appearance
- Use of teaching aids while teaching
- Class-control
- Blackboard work
- Following 'steps of lesson'
- Content

Speech, mannerisms and appearance:

B. Ed students were told they looked too serious, or looked at their watch too often, or adjusted their clothes more than necessary. In the case of the practice lesson described above, Babulal was critiqued for pacing about too much, "like a tiger". He was told that his "movements should be purposeful".

Use of teaching aids:

The use of teaching aids was noticed and comments on their appropriateness were made. One B. Ed student was praised for use of flash cards while another was critiqued for making the lettering on his chart too small. In the case of a third B. Ed student, it was mentioned that the lettering on her chart was

inappropriate with the headings being smaller than the sub-headings. The unevenness of the lettering was also critiqued. Two student-teachers were critiqued for not displaying the chart appropriately during their lessons. In another instance, a student-teacher drew praise for displaying a well-decorated chart with an appropriate arrangement for hanging it up. One lecturer was very critical of a chart made by the student-teacher. She said it was on flimsy paper and ought to have been mounted on thermocol.

Class-control:

The same B. Ed student whose use of flash cards was praised was critiqued for his lack of class control. It was suggested that he could control the students by saying that he would report the names of the offending students to the principal, or by writing up their names on the board. It was also pointed out that since he read out the words from the chart and did not involve the students, they had nothing to do and therefore started talking amongst themselves. Another B. Ed student was critiqued for directing her questions to the same student each time. As already noted in a separate section, the issue of teacher control in the classroom was of considerable importance and student-teachers were expected to have "class-control", by which it was meant that they must prevent children in the classroom from talking out of turn and completely control the pacing of instruction. Student-teachers, when confronted with a noisy or boisterous class, took recourse to raising their

voices and threatening to report the students to the principal. Usha Rani, one of the student-teachers resorted to sarcasm during her practice teaching to put down students she considered disruptive. During Lalitha's class, when the children began talking among themselves while she fumbled to unroll and display a chart, Usha Rani got up from her observer's chair and angrily told the children to keep quiet, and glared at them till they fell silent. Later, when the practice lessons were being discussed, Lalitha was told that she must develop her "class-control".

Blackboard work:

The need to use the blackboard in appropriate ways also drew a lot of comment. Two B. Ed students who had taught language lessons were critiqued for not providing a *"blackboard summary".* It was pointed out that BY's '*boardwork'* was untidy and also that the initial points that he had written on the board remained till the end. It was also pointed out that he did not write the answers to the recapitulation questions on the blackboard.

Following steps of lesson:

Most of the B. Ed students seemed to be following the *"steps of lesson"* and sticking closely to the lesson plan that actually served as a script for the lesson transaction. One B. Ed student was critiqued for forgetting to ask the recapitulation questions. Babulal was appreciated for the "improvement" he

had shown over his previous performance by memorising the key points and not relying on slips of paper as he had done the previous time. Babulal later discussed his difficulties with English and the lecturer told him that he needed to "work on his communication skills". Babulal was told that he needed to practice his sentences, but that he was able to articulate English sentences better as compared with his previous class. If Babulal had to teach the lesson by memorising sentences in English, he would have found it difficult to produce explanatory sentences in response to students' questions. In the transcript of the lesson taught by him, presented earlier in this chapter, it was noted that in response to a student's question about the difference between cilia and flagella, he drew the diagrams on the board and pointed out to these features, without saying anything about them.

During the practice lessons, when student-teachers attempted to teach in English without being fluent in it, some of them resorted to repeating their statements in response to the children's questions (which were infrequent in any case), while others ignored the question and carried on with their scripted lesson.

Content:

Errors made by B. Ed students, such as incorrectly spelt words were mentioned, although some obvious errors in Babulal's spellings were not pointed out. In general, it was quite rare for an error in content to be pointed

out during the feedback session. Although the B. Ed students were supposed to specialise in the teaching of two high school subjects, the 'teaching method' was a general one and not differentiated according to the subject being taught. Lecturers from the college took turns to observe the lessons of the student-teachers and on any given day, only one lecturer would come to the school to observe the practice teaching. Comments on lessons rarely dealt with content and occasionally conceptual errors on the part of the student-teacher went un-noticed by the observing faculty member.

Thus, relatively low importance was given to the content area of the lesson taught during practice teaching. No reference was made during the feedback discussions, to issues pertaining to the development of conceptual understanding of science-related topics amongst the children.

Evaluation of teaching:

Sharada was the external examiner for the B. Ed students when they had their practical examination at government high school, GAH. Although the B. Ed students were supposed to specialise in the teaching of two high school subjects, the 'teaching method' was a general one and not differentiated according to the subject being taught. Thus, the external examiner did not have to be familiar with the content of the subject being taught by the B. Ed student. Grades were awarded on the basis of the observed teaching during a single period.

While speaking to the researcher, about the student-teacher's performance, Sharada used descriptors like, “having a good voice”; “speaking too fast”; “making it interesting by involving the students”; “having good class control”; “she could not manage the students, I had to control the naughty boys”. While evaluating the lessons taught, Sharada used the following format in a small notebook that she carried, while she noted down her observations about the teaching done by the B. Ed student as the final lesson to be graded for the examination.

Reg no. **Date**
Subject
Lesson plan:
Introduction:
Statement of aim:
Development of lesson:
Review questions asked
H.W.
Impression (this consisted of a two sentence description of the student teacher and his lesson)

This was an ordinary student’s notebook purchased by Sharada and she had hand-written the format which is shown below. When the researcher asked whether it was mandatory for all external examiners to maintain such a notebook for the external evaluation, she said that they were only required to give the overall marks, but she liked to note things down for reference in order

to maintain a degree of objectivity in the marks she awarded to each student-teacher.

The range of marks awarded by Sharada to the five B. Ed students she evaluated varied from 40 to 48 out of a possible total of 50 marks. The explanation for this was that Sharada had pre-decided to award all students a minimum of 40 marks so that they do not fare badly in the examinations and to distinguish between good and not-so-good teaching she awarded points between 40 and 48. This strategy was in keeping with the general practice of giving high marks to students in the practical teaching examination. By doing this, examiners enabled many students to get an overall pass, even if they had not managed to do well in the theory examinations. Sharada mentioned to this researcher that private colleges awarded the highest possible marks to all students while internally evaluating teaching practice to ensure that all their students passed. This was corroborated by the faculty from Tunga Teachers' College with whom the researcher interacted. A similar observation was made by Jayalakshmi (2002) – " …boosting of internal assessment marks are said to be a regular feature."

Both feedback on practice teaching and evaluation of it was based on the instructor and the form of instruction. During practice teaching and even more so during the 'final lesson', student-teachers had to adhere to the prepared lesson plan which effectively functioned as a script for the lesson transaction. On occasions when student-teachers were advised to build in

greater interaction into their lessons, it meant that they needed to ask a few leading questions to the students in such a manner as to get the expected answer from the children. Student-teachers, in their anxiety to complete the lesson as planned, would hurry through these questions and upon not receiving the expected answer from the students, quickly supply it and proceeded with the lesson.

The underlying pedagogy endorsed during teacher training was consistent with the view of teaching as a process by which officially sanctioned knowledge was to be transmitted to students in an efficient manner. Evaluation questions were pre-determined as part of the lesson plan and these invariably required a pre-defined correct answer. Student-teachers were not helped to analyse children's responses in order to unearth the misconceptions or cognitive dissonances that might help further conceptual clarity to emerge during classroom transaction. Students' actions and responses were analysed in according to the behaviourist paradigms to be shaped towards pre-determined ends. If a child in the classroom gave the expected answer to the question, it was assumed that the student had acquired the content and the teacher was not required to probe further into the extent of the child' understanding. Further, the class was perceived as an undifferentiated set of students and student-teachers were observed passing the question from one child to another till the expected answer was received and then proceeding with the lesson as planned.

According to the Bangalore University B. Ed syllabus, student-teachers had to practice a set of teaching skills using micro-teaching techniques. Each skill also had certain components listed under it. One of the components of the "Skill of questioning" was called "giving positive reinforcement for student response". Through this process, student-teachers were taught to use behaviourist techniques to elicit the required response from children in the classroom.

The focus during practice teaching was on the form of the lesson delivery rather than on the content. This could be seen by the emphasis on teaching the lesson according to a set pattern, consisting of 'steps'. Planning for lessons was done by the student-teachers under guidance from faculty member who taught the "Content-cum-Methodology (CCM)" paper that was concerned with teaching a specific school subject. Two significant observations were made by this researcher with regard to the supervision of student teaching. First, faculty members took turns to be present in the schools during practice teaching, and therefore the lessons taught by student-teachers were not necessarily observed by the concerned CCM teachers. Second, the feedback and evaluative comments on the lessons were given in a group setting with student- teachers teaching different subjects sitting together with a single supervisor. As a result of both these practices, feedback on teaching tended to be general and not subject specific. Teaching was evaluated on the basis of the student-teacher's adherence to the scripted lesson

plan. Student- teachers received comments on their appearance, communication style, use of teaching aids, class control, blackboard work, ability to teach according to prescribed steps and content. Comments were invariably meant to help the student-teacher deliver a 'perfect' lesson, without discussing how teacher action could help children understand the lesson better. Reasons for differences in children's responses in the classroom were not discussed. Instead, discussions were concerned about quick ways to make children "stay quiet and listen". Student-teachers were unable to articulate their reasons for selecting the information that they would display on the chart that they had made as a teaching aid. Likewise, the student-teacher who used flash-cards in her language class was not able to explain why she had chosen to do so. She said, *"We have to use teaching aids, and my lecturer told me to prepare flash-cards."* This again points to the emphasis during practice teaching on the use of teaching aids without necessarily understanding the specific role of a particular teaching aid in helping children learn content better.

During the "Recapitulation" stage of his lesson about bacteria (transcript of which has been discussed in section 6.4.2 of this chapter), Babulal asked questions about size of bacteria, bacterial cell organelles and the "father of bacteriology". The actual instruction during this lesson did not deal with this information; therefore, the questions were not actually seeking to help students recapitulate what had been taught in this particular lesson. The

lack of relationship between the content of the lesson taught and the recapitulation questions at the end did not draw comment from the supervising teacher educator during the feedback session. Ideally, it should have attracted comment as recapitulation questions at the end of a lesson are meant for the teacher to evaluate how much of the content has been learnt by the children and to help the teacher to plan the next lesson on this basis. Experienced teachers used recapitulation questions to calibrate their own teaching based on students' response. By not drawing the student-teacher's attention to the reason for asking recapitulation questions, the supervising teacher seemed to consider these questions as ritualistic steps of lesson delivery and merely ensured that questions were asked at the end of the lesson without careful consideration being given to the nature of these questions. The implication of this is that during practice teaching student-teachers were trained to pay greater attention to the order and sequence in which they structured the elements of the lesson. The student- teacher was not especially encouraged to give careful consideration to the subject being taught.

6.6 SCIENCE TEACHER PREPARATION

Elementary level

As mentioned earlier in this chapter, the TCH (or the newly-created equivalent, D. Ed) was the required qualification for teachers wishing to teach at the government higher primary schools. In the chapter on teachers (Chapter 4, section 4.1.4) it was discussed that although the TCH course was suppose to

prepare teachers to teach any subject in the higher primary schools, in practice, only a few teachers felt confident enough to teach science to standards VI and VII. It was also noted that teachers at the GAP and GBP had not received any in-service training to help them with science teaching, despite changes in the curriculum, and were left to manage on their own. The DSERT efforts at improving science teaching were focused at the secondary level.

None of the teachers in this study, who taught science at the higher primary level had received training specific to science teaching. There wasn't any in-service programme, specifically for science teaching, that teachers could avail of to improve their knowledge of science and science teaching. There was a State Institute of Science under the DSERT, Karnataka. However, the activities of this wing had an almost exclusive focus on high school science education.

Unlike the earlier TCH course where students were trained for teaching any subject in the primary school, the newly-created D. Ed course allowed for students to choose any two subjects to teach. Ghousia's combination of English and science was one of the combinations chosen by students who felt they could teach English. The other subject combinations were Kannada with Social studies and Mathematics with Science. Admission into the D. Ed course did not require students to have had science at the PUC level even if they intended to take up science teaching at the elementary level. One of the objectives for the revised, D. Ed curriculum was to “provide additional

material through content enrichment to equip teachers to develop a more thorough understanding of the subjects". The next objective as stated was, "to enable the teachers to obtain content mastery through selection of subject groups". Neither Ghousia's teacher training college nor that run by the trust seemed to take this seriously. As a private college lecturer admitted, *"They have already studied these subjects in school; we don't need to teach them again. They also won't be serious in these classes."*

According to D. Ed students interviewed in this study, if they were able to score 60% marks in the content areas they were considered capable of teaching the subjects and would be sent for teaching practice after about two weeks of theory classes. They had to do one month of teaching practice in the first year of the D. Ed course and three months in the second year. Considering that at least some of the D. Ed students, like Ghousia, had opted to teach science without studying it at the higher secondary/PUC level, it would have been desirable for them to have a sufficiently rigorous exposure to science topics taught at higher primary schools. However, this does not seem to have been the case as the general assumption of faculty at the private teacher training colleges was that students do not need rigorous coaching in the content of the subjects they would be teaching. In the case of students like Ghousia, Hari Prasad and Prashant, all of whom had studied at rural government schools and had opted to teach science, there would have been hardly any opportunities to conduct or observe experiments in the course of

the science education they received in secondary school. The SSLC science examination at the end of X standard in Karnataka, does not require students to demonstrate any skill or knowledge about conducting science experiments.

Secondary level

The B. Ed programmes offered across the state of Karnataka varied depending on the University under which the programme was being offered. The B. Ed programme of the Tunga Teachers' College was under Bangalore University. The curriculum consisted of five core papers of which three were foundation papers and two were pedagogical papers. In addition, there were two special papers. A B. Ed student was required to select two pedagogical papers, called content- cum-methodology paper. The syllabus for the three science content-cum-methodology papers (Physics, Chemistry and Biology) has separate units for content and methodology and in that respect seems to be based on what Batra (2009, p.140) describes as a "false premise that subject content has no link with pedagogy". The separation between subject matter content and pedagogical content in teacher education programmes has been contested by Shulman (1986).

In the previous chapter (Chapter 5, Section 5.5), the role of experiments in science teaching was discussed. None of the in-service teachers mentioned specifically learning about conducting experiments in the classroom as part of their B. Ed training. Gayatri (GAH) explicitly mentioned

her lack of familiarity with equipment and apparatus related to Physics as neither her B.Sc; nor her B. Ed course had provided her with opportunity to use such equipment. However, the notion of experiments forming a part of science teaching was mentioned as an ideal by several teachers as has been discussed in the earlier chapter on science teaching (Chapter 5, Section 5.5.1). When this researcher asked the student-teachers whether they had opportunities to prepare for and conduct experiments as part of their lesson plan for teaching a concept in science, they answered that although the college had a laboratory, they did not use it to try out experiments that could be performed in the classroom. Experiments were not performed in any of the lessons taught by the science student-teachers and observed during this research. In the case of one student-teacher's lesson, described below, an experiment was explicitly mentioned in the lesson plan but not performed and this aspect was neither noted nor commented upon during the feedback session.

Practice 3, PU

Usha Rani, a B. Ed student from Tunga Teachers' College, was teaching a lesson to standard IX B at Tunga Public School (PU) which was an English medium school. Usha had been allotted the third period in the morning which commenced at 11 a.m. There were 30 students in the class on that day. Usha's lesson too followed the lesson plan script that she had written. She was teaching a lesson on current electricity and had introduced the terms "current" and "electric current" as part of the "Introduction" to the lesson. She then asked the students to recall the important effects of electricity. After this, she told the students about appliances like "electric fan, telephone and microphone that had components which worked on the magnetic effect of electricity". Next, she told the students that there were some instruments that used the magnetic effect of electric current. She said, "We have said about apparatus

like fan, microphone, etc. Now I will tell about electrical measuring instruments like ammeter, galvanometer, voltmeter, tangent galvanometer and moving coil galvanometer." She unrolled a chart with diagrams of these instruments (drawn by her) and stuck the chart on the wall next to the black board. She pointed out the different instruments on the chart. Next, she pointed to the instruments and had the students name in chorus the instrument she was pointing. After this, she wrote down the functions of galvanometer and voltmeter respectively on the board. She also read these out aloud for the children. She then told the students that electric current would be produced when electric charges flow through a conductor. She said,

> "The flow of liquids is called current, whereas the flow of electric charges is called electric current. Liquid will flow from higher point to lower, like that electric charge will flow from point A having higher potential difference as compared to point B if we connect A and B with a metallic conductor."

Her lesson plan at this point mentioned under the column, titled, "Teacher's Activity" the following: "The teacher illustrates this with an experiment." Usha drew a diagram on the board showing two circular objects on stands and labeled them A and B respectively. She then drew a line connecting the two objects and told the students that the line was the metallic conductor. She told students that current would flow from A to B as A had higher potential difference.

After this, she proceeded with the lesson and told the students, "Electric current is the quantity of electric charges through a point over time taken." She then wrote on the board

$$\text{Electric current} = \frac{\text{quantity of electric charges through a point}}{\text{Time taken}}$$

$$\text{Electric current (I)} = Q/t$$

She then said, "S.I. unit of electric current is ampere. One coulomb per second is called one ampere."

She continued with the lesson giving students the definition of electrical circuit and also the definition of a circuit diagram. She used a chart to illustrate a simple circuit diagram. After this, she asked the students three recapitulation questions and wrote the homework questions on the board. Then since there were still about five minutes remaining before the 40-minute period was due to get over, Usha pulled out an ammeter and a galvanometer from a bag that she had brought to class and held these instruments up briefly for the students to see and then placed them on the desk. She then narrated incidents about Ampere and his suffering during the French Revolution and told the students that they must learn to overcome adversity and become famous the way Ampere had done. The story of Ampere was given in a box in the students' text books.

Usha's concerns like those of her peers were focused on speaking out the key points of the lesson in the sequence mentioned in the lesson plan and in transacting the lesson according to the "steps". The role of experiment was analogous to that of a visual aid and in the overall scheme of the lesson, it was dispensable, especially since Usha had displayed the customary charts and also shown the class an ammeter and a voltmeter that she had obtained from the school's laboratory.

Later, during the group feedback time, the supervising faculty member gave positive feedback to Usha Rani for her use of teaching aids and for telling the story about Ampere. No reference was made to the experiment that was not performed. Thus, there seemed to be nothing unusual about this in the eyes of the B. Ed faculty and students. None of the B. Ed practice lessons observed at Tunga Public School involved the performance or demonstration of experiments, although in some of the lessons, objects were brought in to be used as visual aids.

What was also observed was that during practice teaching not much attention was given to the subject matter that was being taught. The B. Ed lecturer who observed the B. Ed students' class was not necessarily conversant with the subject being taught and in any case, the B. Ed educators took turns to observe student teaching and therefore, were expected to give feedback on the form of the lesson rather than on the content. Occasionally, student-teachers

did receive criticism about 'mistakes' in spellings or facts that they had presented, but this was more an exception than the rule.

B. Ed students, as already mentioned, focused on the method of lesson delivery rather than on the subject matter that they were supposed to be teaching. While preparing for a lesson about the expansion of material due to heat, a B. Ed trainee wanted to know “Is there linear expansion in fluids?” She was satisfied when she was told by this researcher that for fluids one could not apply the idea of linear expansion and was not ready to investigate the idea of volume expansion, saying, “If the students ask, I can tell it is not there in fluids.”

6.7 DISCUSSION

The impact of teacher education on teacher's behaviour in schools has been a recurrent issue in the literature on teacher education. Several authors claim that the effects of teacher education on the actual practices of several teachers are generally meagre. A gap between theory and practice seems to persist across different times and context. In Lortie's (1975) well-known work, the dominant role of practice in shaping teacher development was set out. Student teaching occupies a significant space in teacher education programmes. During the initial experience of practice teaching, ideal images are confronted with the demands of reality. The novice teacher must demonstrate her skills under the scrutiny of the supervising teacher. Often the focus of this supervision is the student-teacher's ability to successfully manage the class.

In line with Lortie's (1975) work, Zeichner and Tabachnik (1981) showed how educational ideas developed during pre-service teacher education are "washed out" during field experiences. Similar findings were reported in a review by Veenman (1984), who also pointed to the severe problems teachers experience once they have left pre-service education. Lack of transfer from teacher education to practice has been summarised in reviews by Feiman-Nemser (1990) and Wideen, Mayer-Smith, and Moon (1998). The problem is not confined to any one country and researchers in Germany (Dann et al 1981, cited in Brouwer and Korthagen, 2005), US (Corcoran 1981) spoke about the "reality shock" or "practice shock". Cole and Knowles (1993) reported that student-teachers' idealistic images of teaching were shattered during their confrontations with the realities of teaching. All these studies show that, during and immediately after their pre-service programmes, teachers experience a distinct attitude shift that entails an adjustment to teaching practices existing in schools.

In the case of the student-teachers in this study, "practice-shock" was not noticed. Practice teaching took place in a relatively insulated way as has been discussed in section 6.5 of this chapter. Student-teachers were not confronted with anything like the teaching load that in-service teachers faced. They were also not held accountable for student learning in the same way that in-service teachers were. Student-teachers who were unable to manage student behaviour in their classrooms were assisted by class leaders, peers or faculty

from the teaching colleges. Most of the student-teachers seemed anxious about the criticisms they anticipated from the faculty who would be observing their lessons, particularly if they felt under-confident about their ability to maintain "class-control". Control over students was established by means of raised voice tone, eye contact or use of a threat. One threat, often resorted to by student-teachers who were unable to control the children was to threaten to report the class to the principal.

> "Control is a salient aspect of school life. It is an important dilemma for all teachers, but is particularly problematic for beginning teachers. New teachers, especially student-teachers, are concerned not only with establishing order and gaining student cooperation but also with their own competence as teachers. In facing these issues, beginning teachers may find their ideas about classroom management and student motivation challenged and finally changed. Thus, resolution of dilemmas about control, motivation, and personal competence is likely to be a significant factor in the socialisation of student teachers." (Hoy & Woolfolk, 1990: p. 280)

In the government high school, GAH, student-teachers were made to experience the importance of establishing the absolute dominance of the teacher by physical means if necessary. The notion of teacher as absolute authority seemed to be widely shared by teachers as well as students.

Teachers' orientation toward control, social problem solving, and efficacy have been related to significant cognitive and affective outcomes for students. Teachers' orientations toward control are associated with their students' sense of alienation and self-esteem; the more controlling the orientation, the more alienated the students and lower their self-esteem (Deibert & Hoy, 1977; Hoy, 1972). Teachers' social problem solving style appears to influence both students' intrinsic motivation and their approaches to solving classroom problems (Prawat & Anderson, 1989). Finally, teachers' sense of their own ability to affect student learning has been consistently related to student achievement (Armor et al., 1976). Particularly in the government schools, GAH and GBP, teachers maintained tight control over student talk, movement and action whenever they were present in the classroom and this was something that had to be learned by student-teachers in order to be judged as effective at 'class-control', one of the criteria by which practice teaching was assessed. This was true at the private school too with the difference that hitting of children was not used as a method of control.

Hoy and Woolfolk (1990) showed in their study that organisational socialisation results in the adoption of a more custodial pupil control orientation.

> "The model of the custodial perspective is the traditional school that provides an inflexible and highly regimented setting concerned

> primarily with maintaining order. Students are stereotyped according to their appearance, behaviour, and family social status. Teachers who hold a custodial orientation conceive of the school as an autocratic organisation with a rigid pupil-teacher status hierarchy. The flow of power and communication is unilaterally downward. Students must accept the orders of their teachers without question" (Hoy and Woolfolk, 1990, p.281).

This type of orientation was noticed to a great extent in the government schools and also to some extent in the private school PU. Student-teachers who had difficulties in class control were assisted by experienced teachers (Sharada), peers (Usha Rani) or faculty from the teacher college, who modelled control strategies aligned with custodial pupil orientation.

From their review of the research on learning to teach, Wideen et al. (1998) concluded that beginning teachers struggle for control and experience feeling of frustration, anger and bewilderment. The process they go through is more one of survival than of learning from experiences. Novice teachers do not feel sufficiently prepared by their teacher educators and come to view colleagues in their schools as "realistic" role models, as the people who "do know" how one should go about teaching.

Kumar (2002: p. 8) compared the situations of a trained teacher finding a job with that of junior doctor becoming a full- fledged doctor. Highlighting the

differences in training, Kumar wrote, “Unlike a junior or trainee doctor, whose hours of work and duties are more than a regular doctor's, the number of teaching hours or lessons that a trainee teacher has to put in is far less than a regular teacher has to.” The B. Ed students had to teach a single period a day, whereas a teacher on the job in the same school was expected to handle between five to seven periods on any given day. The 25 lessons that they were supposed to teach in the two subjects they had opted for were all supposed to be 'planned' lessons which were carefully recorded in the given format and presented at the time of evaluation. The assumption was

> “that a trainee's life at school will be very different from a regular teacher's life, and one of the features marking the difference between the two will be the former's compulsory necessity to prepare an elaborate plan for each lesson. We can confidently say that with regard to the separation of life during training from the real job, the B. Ed programme is unique. And it is worth noting that the practice of elaborately planned lessons is not the only feature that distinguishes it in this respect. As indicated earlier, apart from the lesson plan file, the B. Ed student also announces her identity at the school assigned to her for teaching practice by the charts, models, and other gear – including arcane objects like a roller blackboard – that she carries with her”(Kumar, 2002: p. 8).

Further, Kumar argued that the hiatus between the life of a regular teacher and the trainee teacher "reflected the hiatus between teacher training and other aspects of the system of education, including the running of schools, the planning of curriculum and the preparation of textbooks" (Kumar 2002: p.10).

Both teachers and student-teachers in this study seemed to bracket out their experience of practice teaching as being only marginally relevant to their eventual work as teachers. Shivraj's (PU) comments about the B. Ed course helping in terms of understanding the psychology of children was exceptional as it was the only one that explicitly referred to the theory component of the B. Ed curriculum.

The remarks by Usha Rani about how teachers teach were drawn from her own interpretation of the teaching she experienced as a student. The ways by which schooling prepares people for work is often overlooked. This

> "oversight is especially serious with public school teachers, for participation in school has special occupational effect on those who do move to the other side of the desk. There are ways in which being a student is like serving an apprenticeship in teaching; students have protracted face-to-face and consequential interactions with established teachers" (Lortie, 1975, p.61).

The student's interaction with the teacher is not a passive one – it is one that is consequential for the student and thus is invested with affect. In the terms of symbolic interaction theory, students learn to "take the role" of the classroom teacher, to engage in at least enough empathy to anticipate the teacher's probable reaction to his behaviour.

Lortie (1975) highlighted the contrasts between the nature of practice teaching and arrangements for apprenticeship or internship in other professional fields. According to Lortie, formal apprenticeship has cognitive characteristic as the novice is guided through a series of tasks that are ascending in terms of difficulty and responsibility. In the classical forms of apprenticeship, the beginner receives support from co-workers as he gains mastery of the group's technical vocabulary and the knowledge nested in it. Practice teaching, as described in this section, did not have the nature of apprenticeship as the B. Ed student did not work alongside the experienced teachers, nor even interact significantly with them.

The other significant observation was the relatively low importance given to the content of the lesson taught during practice teaching. As mentioned earlier, little reference was made to issues pertaining to the development of conceptual understanding of science-related topics amongst the children. Subject specific comments were rarely given to student- teachers during the feedback sessions and much more importance was given to the form of instructional delivery.

Shulman (1986) suggested that subject matter has been ignored in educational policy, practice and research: “Policymakers read the research on teaching literature and find it replete with references to direct instruction, time on task, wait time, ordered turns, lower-order questions and the like. They find little or no reference to subject matter, so the resulting standards or mandates lack any reference to content dimensions of teaching. Similarly, even, in the research community, the importance of content has been forgotten. Research programmes that arose in response to the dominance of process-product work accepted its definition of the problem and continued to treat teaching more or less generically, or at least as if the content of instruction were relatively unimportant (Shulman, 1986 p.6).

Hulin-Austin (1992) suggests that the subject matter issue in relation to beginning teachers is critically important because many beginning teachers have come through teacher preparation programmes that ignored subject matter. Most teachers begin with some expertise in the content area they teach, but will likely not be that proficient in transforming it in ways that students can comprehend. Mentor teachers can help them with subject matter if they receive adequate training and preparation. As already noted, there was very little exchange of any kind between student-teachers and regular teachers of the school and new teachers were expected to take on the same teaching load as an experienced teacher allowing neither to engage in any sustained or systematic form of skill exchange.

Hulin-Austin (1992) surveyed research on how teachers learn to teach and wrote about the implications of this research for the design of induction and mentoring programmes. Research studies indicated that giving beginning teachers difficult teaching assignments such as teaching multiple subjects was not advisable because of the stress these assignments are likely to induce and because students in classrooms of such novice teachers are likely to suffer because of the teachers' inadequate preparation (Hoffman et al., 1986).

In the second year of field work for this research study (July 2007), in the private school (PU) several teachers had left and the existing teachers had to take on the responsibility of teaching subjects that they were not comfortable teaching. Shantala, in her third year of teaching, had to teach Mathematics and Physics for VIII, XI and X standards but would have preferred to teach only Mathematics. Savitri was teaching Biology and Chemistry to these standards and said that she would have liked to concentrate only on Biology. Both the teachers wanted to know if this researcher could take up teaching in the school, “It will help. You know what the students think” was what they told this researcher. Savitri was trying very hard to understand the chemistry content that she had to teach and on one occasion, asked the researcher about the coolant circuit in a nuclear reactor and understood the closed circulation of the sodium when an analogy of the circulation of blood was given. These incidents show that the anxiety induced

by having to teach a new content area was experienced even by teachers who were not new to their work.

Livingston and Borko (1989) suggested another reason why novice teachers should not be given multiple teaching assignments. This was because novices learnt more about teaching when they teach the same content multiple times. Livingston and Borko proposed that beginning teachers would develop teaching expertise more quickly if given fewer preparations because they would have more opportunities to teach the same content. The importance of the mentor teacher and other supportive colleagues is well-documented in the teacher induction literature (Bey & Holmes, 1990; Brooks, 1987; Hulin-Austin, 1992) and is also documented in literature about learning to teach. A study by Smylie (1989) found that of 14 possible sources of learning, direct experience in the classroom was the only source that teachers ranked higher than consultation with other teachers. Several other studies have also indicated the importance of the mentor teacher to the novice teacher (Carter 1990, Richardson, 1990; Livingston & Borko, 1989).

This chapter has indicated that the practice teaching of D. Ed student-teachers was not closely supervised or mentored. These student-teachers did not interact very much with in-service teachers in the school. In the private school PU, the D. Ed students were not given responsibility for teaching regular classes and had to substitute for regular teachers whenever required to do so. The understanding was that they could take over the child-minding

function and any teaching that they did was incidental. In the government school, GBP, the D. Ed students were handed over charge of multiple classes as the teachers seemed indifferent about the way children were taught. The somewhat fluid way in which regular teachers took classes in this school has been discussed in Chapter 5.

Commenting on the problem of the hiatus between theory and practice, Batra (2009) says that teacher education curricula are premised on the notion that after acquiring knowledge trainees will be able to apply this to their teaching. This does not happen and "supervising tutors talk about practice and experience, and implicitly suggest the need for ….situated knowledge" (Lewin & Stuart, 2003, p.87The theory-practice gap is inherent in the design of conventional teacher education programmes in India, according to Batra (2009).

The rationale for including the school experience/internship programme in the D. Ed is to enable student-teachers to practice in real situations and learn from experience. The general paradigm for learning is simple, according to Shulman (2004) an individual or group engages in a particular action for the sake of achieving a desired end. When the desired end is achieved, people learn to use the action again under similar circumstances. When the end is not achieved, or a less desirable condition arises, people learn to avoid that action or class of actions. Shulman argues that the two most obvious requirements of learning from experience in the field of teaching –

knowing what was done and accurately identifying the consequences of the action- can be hard to achieve.

> "Learning from experience in teaching is more than honing or tuning a skill so that it becomes automatic. It is raising the skill to thinking, giving reason to action and value to goals. This will require that teachers work in structures that permit such interactions, be prepared in programmes and institutions that both teach and model such processes, and be themselves individuals who can change the effort" (Shulman, 2004, p.332).

The largely unsupervised practice teaching experiences of the D. Ed student-teachers did not support reflective experiential learning.

The practice teaching of the B. Ed students followed a rather ritualised form that seems to characterise most conventional secondary teacher education programmes (Kumar,2002; Sinha, 2002)

> "They (B. Ed students) use up their time participating in several activities and fulfilling endless requirements. Additionally, most of them are busy developing visual aids (mostly posters) that do not contribute to any understanding. All this does not permit them to devote time to either reading or thinking through ideas. They,

> therefore, end up writing extensive lesson plans that are just a re-formatting of the book chapters. It is indeed a tragedy of education programmes that pre-service teachers are so tied up with ancillary activities that the actual heart of the matter (knowing about theory and interpreting it in the classroom context) escapes their notice. Ultimately, the length of lesson plans, the enormous time and energy that the student invests in them, the lack of any theoretical understanding proves the fact that education departments value busy work more than thinking. There is a complete delinking between theory and practice." (Sinha, 2002, p.22)

Analysing the underlying assumptions behind the lesson plans, Sinha (2002) wrote that the child is taken for granted as a passive recipient of knowledge. Knowledge is considered to reside in the textbooks and the teacher's role is to transmit it. As discussed in Chapter 5, this assumption was also implicit in the teachers' praxis observed in the government schools, the private unaided school and to some degree, in the international school. Thus it was possible to observe how pre-service teacher training and in-service teaching constituted the pedagogic recontextualisation field as theorised by Bernstein (2000).

The underlying notions about children, learning and teaching that are present in the pedagogic recontextualisation field are not consonant with the ideals of education that are contained in the National Curriculum Framework

(NCF 2005). This framework expresses ideas that have a considerable history in the national policies for school education that have been developed since independence. In the context of science education, the Position paper on Science Education (NCERT 2006) states:

> "At the upper primary stage, the child should be engaged in learning principles of science through familiar experiences, working with hands to design simple technological units and modules (e.g. designing and making a working model of a windmill to lift weights) and continuing to learn more on environment and health through activities and surveys. Scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science. Group activity, discussions with peers and teachers, surveys, organisation of data and their display through exhibitions, etc. in schools and neighbourhood are to be an important component of pedagogy. There should be continuous as well as periodic assessment (unit tests, term end tests). The system of 'direct' grades should be adopted. There should be no detention. Every child who attends eight years of school should be eligible to enter Class IX.
>
> At the secondary stage, the students should be engaged in learning science as a composite discipline, in working with hands and

> tools to design more advanced technological modules than at the upper primary stage, and in activities and analysis on issues surrounding environment and health.
>
> Systematic experimentation as a tool to discover/verify theoretical principles, and working on locally significant projects involving science and technology are to be important parts of the curriculum at this stage" (NCERT 2005, 1.1, p . 31)

The above conception of science education differs considerably from what was being transmitted to the student-teachers.

> "Ideally, a curriculum framework for teacher education would be expected to be in consonance with the curriculum framework for school education. … However, the current teacher education curriculum framework neither engages with the learner (in this case, the teacher) nor the learning process, content and pedagogy of educating teachers." (Batra, 2009 p.135)

Thus the pedagogic recontextualising field as constituted by the teachers and the teacher training colleges is in conflict with the stated goals and objectives of the curricular reforms suggested by the official recontextualising field

constituted by the national-level organisations like the NCERT where a shift to more constructivist pedagogies has been recommended.

All the student- teachers practised in schools that were in the same ORF, namely that created by the DSERT of the Karnataka state. Earlier in this chapter it was pointed out that student- teachers who were studying to teach in Kannada, were sent to government schools and those who opted to teach in English were sent to private schools. The student- teachers who were sent to government schools for practice teachings had also done their schooling in government schools. Thus the experience of Kannada medium student-teachers' both at school and later as student-teachers was confined to the same ORF. This was not necessarily the case with student-teachers who went to PU which was an English medium school. As has been discussed earlier, these student-teachers came from different school backgrounds. The ORF in which practice teaching was done interacted with the PRF of the teacher training institutions and also with individual teacher biographies, resulting a complex constitution of classroom praxis and the habitus of the teachers.

The interaction of different ORF with teachers' personal biographies seemed to engender the dispositions or habitus of teachers, who were agents within the PRF. According to the theorizing of Bourdieu, the habitus is a central construct which aligns closely with identity. "The habitus is a system of durable, transposable dispositions", which predispose the participant to act, think and behave in particular ways (Bourdieu, 1979). If curricular reform

processes require teachers to substantially change their teaching practices in order to address the issue of effective and equitable science teaching for all students then it is important to consider the autonomy of the PRF and explore ways and means by which change in this can be brought about. This study has shown that teachers' habitus interacts with different ORF producing different degrees of stability within the PRF.

Thus far, this section has discussed four aspects apparent in the practice teaching component of teacher education programmes – the establishment of teachers' authority over students; the focus on the form of the lesson rather than the content; the hiatus between theory and practice and the dissonance between the official recontextualising field and the pedagogic recontextualising field in the case of science education. The final point to that remains to be discussed is the non-cognisance of student diversity in the teacher preparation programmes.

Irrespective of which schools they are assigned to for practice teaching, student-teachers received the same kind of instruction from the faculty for their lesson plans. The possibility of different learners having different learning needs was not considered at any time in the teacher education programmes. There is no space in the teacher preparation programme for student-teachers to enquire into differing learning needs of students on the basis of socio-economic status, caste, gender and linguistic diversity (Batra, 2009). The student- teachers did not engage with the question

of the relationship between school and society, the social construction of knowledge and curricula and how power is produced and re-produced through education. During their practice teaching, student-teachers were evaluated on their lesson delivery and not on the appropriateness of the pedagogy in the context of the learners. The children in the classroom were incidental to the process, 'to be managed' and from whom the appropriate responses were to be elicited. Thus, student-teachers' notions about the relationship between children's socio-economic backgrounds and school achievement were not called to question during their practice teaching allowing the perpetuation of popular stereo-types about individual student's ability being the main determinant to his or her success in school.

7 CONCLUSION

In the introductory chapter to this work, the problem of exclusion of students from low socio-economic back-grounds from science related careers and occupations was posed. The relation between teacher praxis, classroom processes and the achievement in science of students from different socio economic backgrounds was studied using multi-sited ethnography across four different schools in Bangalore. Two government schools, a private unaided school and an international school were the sites where ethnographic work on teachers and classrooms was carried out. Review of literature pertaining to the issue showed the many dimensions and complexities involved in disentangling this problem. The dilemma between the 'science for all' view and the more traditional view of teaching science as an important body of knowledge to be transmitted to students has been mentioned in the introduction to this work. Reference was also made to the two broad research traditions that examined the teaching and learning of science, namely the science education tradition and the socio-cultural tradition, and their differing emphases.

In the context of the present research on the classroom level processes that occur in different classrooms with students from different socio-economic backgrounds, it was felt that a review of literature pertaining to the cultural reasons for the marginalization of certain sections of students' in science classes should be attempted. The vision of science for all has lead to several

research studies about understanding the relationships between students' cultural backgrounds and learning of science (Aikenhead, 1996; Coburn, 1993; Cobern & Aikenhead, 1998; Costa, 1995; Driver, 1979; Jegede, 1997). Broadly speaking, these studies posit a difference between the students' culture and the culture of science and thus account for differential achievement of students in science. However on theoretical grounds, there are two somewhat problematic issues about these studies. The first issue is that it may not be entirely correct to hold either the culture of science (assuming that such a culture was clearly discernible) or the culture of the students as static or invariant. The second issue is whether the discourse of science teaching can be said to coincide with the discourse of science.

The work presented in this study indicated that the discourse of science teaching cannot be assumed to be the same as the discourse of science and thus brought into question the notion of trying to understand students' failure in science on the basis of posited dissonances between the scientific world view and that of the students. As discussed in Chapter 5, classroom teaching across the different schools was not focused on inquiry, hypothesizing or making empirical observations and measurements. The overwhelming emphasis across schools was to transmit existing knowledge to the students and experiments were used to demonstrate or illustrate scientific phenomena rather than to promote open ended investigations.

Discussions about science education often start by outlining the nature of science and derive implications and guidelines for education from this. "Any account of teaching and learning science needs to consider the nature of the knowledge to be taught. Although recent writings in the field of science studies emphasize that scientific practices cannot be characterized in a simplistic unitary way, that is there is no single 'nature of science', there are some core commitments associated with scientific practices and knowledge claims that have implications for science educators"(Driver et al., 1994, p.5). The Position Paper on Teaching of Science developed by the national focus group of the National Council for Educational Research and Training also begins by first discussing the nature of science. Science is expected to play an emancipatory role in society.

> "In a progressive forward-looking society, science can play a truly liberating role, helping people out of the vicious circle of poverty, ignorance and superstition. In a democratic political framework, the possible aberrations and misuse of science can be checked by the people themselves. Science tempered with wisdom, is the surest and only way to human welfare. This conviction provides the basic rationale for science education." (NCERT, 2006)

This is a very idealistic formulation and implies that science education would equip students with a critical understanding of science, its practice and

limitations. The document acknowledged that science education in India was far from achieving equity and that at best it developed competence but not inventiveness and creativity. The onus of fulfilling the lofty goals of science education after the official science curriculum had been framed by the NCERT was placed on schools and teachers. This study therefore looked at selected schools and the teachers who taught science in them in order to understand how the actual work of science teaching was carried on and how scientific knowledge was transmitted.

Bernstein from 1980 onwards had theorized extensively about the transmission of knowledge. A theory of the construction of pedagogic discourse, its distributive, recontextualizing and evaluative rules, and their social basis, was developed: the pedagogic device (Morais, 2006). According to Bernstein (Bernstein 2000) the pedagogic device regulates the production of the school curriculum and its transmission. The distributive rules mediate the social order through distributing different forms of knowledge and consciousness to diverse social groups. Using this frame the data from the different school sites and the work of teachers dealing with different sets of students has been analysed. The summary of the findings and their implications for student achievement are presented in this, concluding chapter of the research.

7.1. THE SCHOOLS

The schools in Bangalore were strongly classified in terms of the boards of education that they are affiliated to. Within government schools the classification of high school and primary school were again strong and so was the framing resulting in insulation between these two types of schools despite their close physical proximity. The education policies of the state of Karnataka, largely determined the kind of schools that students from different social backgrounds could go to. The curriculum followed in these schools was also a matter of policy. All schools within Karnataka state, whether private or state run were required to be registered with the State Education Department and had to follow the rules and regulations of this department regarding, curriculum, evaluation and fees to be charged. Private schools that wanted to follow curricula different from that prescribed by the Karnataka state department, had to obtain a certificate of no objection from the state department and then get the necessary accreditation from the other national or international boards of education. Schools that had obtained the certificate of no objection could follow a different curriculum than that prescribed by the state. The tuition fees charged by these schools were also not stipulated by the state.

The annual fee charged at the international school PI was nearly four times that charged by the private unaided school affiliated to the KSEEB. As discussed in the third chapter of this study, the differential fees charged by the

different schools meant that students could gain access to schools on the basis of their socio-economic class. The private school, PU, and the government school complex GA had student profiles that were fairly typical of the student profiles for different school types in the district. The government schools had a slightly higher proportion of girls – 51 percent as compared to private unaided schools that had 49% girls. The government schools had over 25 percent students from scheduled castes whereas private schools had only 8 percent students from scheduled caste backgrounds. Kingdon (1996) found that richer households were the ones that could afford to send their children to private unaided institutions that charged fees. This study also found that male children had a higher probability of being enrolled at private schools. The type of school that a student attends determines the education experienced by the student.

As discussed in Chapter 3, the government schools had poorly maintained infrastructure and premises that were accessible to the public in general. Students in GA studied in classrooms that were overcrowded and lacked adequate seating arrangements. Students in GB had better infrastructure and classrooms there were adequately furnished. Neither of these government school complexes had provisions for laboratory spaces where students could carry out experiments or investigations. The private school PU had well maintained infrastructure with adequate laboratory space. Finally, at the other end of the spectrum was the international school PI that had spacious and

attractively designed classrooms with well equipped laboratories. The pupil teacher ratios in these schools ranged from 65 in GAH to 13 in PI. Thus it was observed that the higher the social class of the students attending a school, the better was the resources available to them in terms of classroom, furniture, laboratory, library, pupil teacher ratios.

A study by Chiu and Khoo (2005) examined how resources, distribution inequality, and biases toward privileged students affected the average academic performance of all students in a given country. Fifteen-year-olds from 41 countries completed a questionnaire and tests in mathematics, reading, and science. Multilevel regression analyses showed that students scored higher in all subjects when they had more resources in their country, family, or school. Students in countries with higher inequality, clustering of privileged students, or unequal distribution of certified teachers typically had lower scores. Distribution inequality favored privileged students, in that schools with more privileged students typically had more resources. Overall, students scored lower when parent job status had a larger effect on student performance (privileged student bias) in a school or country. These results suggest that equal opportunity is linked to higher overall student achievement. As discussed in chapter 3 it was observed that the opportunities for students were far from equal across the different types of schools in Bangalore.

Parents with more social capital have more education and skills which they can use to teach their children cognitive skills, and social and cultural norms which have a higher value within the school system. Parents with higher income also use their income to buy educational resources for their children, in the form of well resourced schooling, tutoring, books and computers (Aston & McLanahan, 1991; Entwisle & Alexander, 1995; Le Masters & DeFrain, 1989). Finally, parents with more human and financial capital tend to have larger social networks made up of more highly skilled and educated people (i.e., social capital; Horvat, Weininger, & Lareau, 2003). Children can benefit from these networks directly via immediate interactions with network members or indirectly via their parents, who can access more social and cultural parenting resources (Cochran & Dean, 1991; Swick & Broadway, 1997; Wells & Crain, 1994).

Given the overwhelming advantages that students from higher socio-economic backgrounds have in comparison with poorer students it is important to understand whether teachers in the different schools followed similar pedagogies and whether these pedagogies had similar consequences for children in different classrooms. In this study it was found that teachers were aware of the social stratification of students into different schools and this influenced their response to students in their classrooms and to some extent influenced their pedagogy. Teachers themselves came from different social and class backgrounds and this dimension was also examined. The next

section presents a summary about teachers and their work in the different schools.

7.2. THE TEACHERS

In Chapter 4 the working lives of science teachers in the different types of schools were discussed with a view to understand how their pedagogy is constituted in the context of the schools where they worked. The attempt was to portray teachers and their work and in the process privilege the voices of the teachers rather than place them within a theoretical framework. All the 24 teacher respondents in this study had pre-service teacher training qualifications appropriate to the level at which they were teaching. Teachers in government primary schools had a TCH qualification and the teachers who taught in high schools had a B. Ed qualification.

Men and women teachers across the different schools expressed that they derived a sense of enjoyment by working with children. Only one teacher articulated the notion of teaching as a special mission that was important to nation building. Women teachers in all the schools mentioned that teaching as a career was suitable for women as it allowed them to balance work and family responsibilities. Four of the five men teachers in this study had come into the profession after having worked in other fields. Three out of the nineteen women in the study had moved into teaching from other jobs. About

20% of the teachers spoke about the opportunities for increasing their own knowledge and understanding of the subject as positive aspects of teaching.

All the teachers in government schools intended to continue in their current job till retirement and this was due to the salary and other benefits that they got as government employees. In contrast, the teachers in PU expressed their dissatisfaction with the low salaries that they got and were seeking other options. Sivaraj took the selection test for government secondary teachers and moved out of PU during the course of this study. Arati, also from PU discontinued teaching, preferring to stay at home. Teachers at PI drew salaries that were higher than those of government school teachers and expressed satisfaction in this regard. However these teachers expressed that they would not hesitate to relocate if their husbands' were posted out of Bangalore.

One significant observation was that teachers in general tended to circulate within a particular school type. Science teachers in the government schools, GA and GB had studied in government schools themselves and this indicated that these teachers came from lower socio-economic or rural backgrounds, since government schools were predominantly schools for the poor or disadvantages, as discussed in chapter 1. The biographies of teachers also clearly showed that teachers in government schools had come from homes with modest incomes. 80 percent of the science teachers in PU which was affiliated to, KSEEB, the local state board, also had studied

in government schools. Thus the teachers who taught in the schools affiliated to the Karnataka state board, whether government or private had themselves studied in schools similarly affiliated. On the other hand all the teachers who taught at PI, had studied in private schools affiliated to the national board, CISCE, to which PI was also affiliated. The biographies of these teachers also indicated that they had come from fairly affluent backgrounds and had grown up in urban areas.

Bourdieu's notion of 'habitus' can be invoked to analyse this observation. The habitus is the set of durable dispositions that people carry within them that shapes their attitudes, behaviours and responses to given situations. The habitus can be discerned at the level of people's thoughts and the language that they use, but it also works at the level of the body, shaping what might seem instinctive responses. It is as much unconscious as conscious. The habitus expresses itself in the innumerable practices that make up everyday life of an individual. At the same time, the habitus also has a collective aspect in the sense that the common situation that teachers find themselves in disposes them to certain shared actions (Webb et al, 2002). Teachers in the government schools resorted to hitting children with bare hands or sticks in order to discipline them and reciprocally children had come to accept this as part of the process of schooling. A raised hand in a government classroom elicited an instinctive bodily response from the children. Hitting of children was not observed in PU or PI.

The teachers' working conditions differed greatly in the different schools. As discussed in Chapter 4, teachers in government schools had to often deal directly with various contingencies. They were also tasked with several non-teaching duties and administrative work like maintaining lists of students from different caste backgrounds and ensuring that various government schemes and programs for students from particular castes were carried out. They were called upon to attend meetings or training workshops at the cluster and block level with very little notice. Government school teachers were also responsible for ensuring students' attendance in school, unlike private school teachers where the onus of ensuring students' attendance was on the parents/caregivers. The government also drew upon government school teachers to do the work related to elections and census. Teachers in government schools had developed mechanisms for coping and resisting tasks that were thrust upon them by applying for casual leave, by spending longer than the stipulated time in tasks such as voters' enumeration. They also "managed" personal emergencies by tacitly arranging for colleagues to "cover" for their absence. As a result of all this the actual face to face teaching time was curtailed and the students of government schools were at a disadvantage in this respect. Quantitative studies in the Indian context indicated that one of the institutional factors that related with student achievement was the time spent on instruction (Kingdon1996).

The third and fourth chapters had also drawn attention to ways in the different schools structured the work of teachers through physical and administrative arrangements. In the government schools classrooms and teachers were not insulated from direct interaction with parents and other members of the public. This was not the case with the private schools, where classrooms were insulated to a large extent in order to minimize the disturbance of lessons. The consequence of these different arrangements was that students who paid for their schooling received more undisturbed teaching from their teachers as compared to students who were provided free education.

Teachers across schools mentioned the students' home backgrounds as being an important factor in helping students do well at school. Teachers in the private school referred to the inability or unwillingness of a section of parents to offer their children tutoring help as one of the factors that made teaching these children difficult. These students were likely to score poorly in tests according to the teachers. Chiu & Khoo (2005) discussed privileged student bias. According to them in school systems with larger distribution inequalities, privileged parents have more incentive to use their capital to obtain more educational resources for their children. State policies that result in richer students having more access to educational resources exacerbate the effects of disparities in income.

The government school teachers were well aware of the lack of academic home support for their students and made several references to it while accounting for student underachievement. By contrast, at PI there was a taken-for-granted attitude about the support students would receive from their homes and students home backgrounds did not figure in conversations about student achievement. What was mentioned was how parents further supported the classroom teaching by being able to offer their own personal expertise in the fields related to the topics being taught in school.

At GBG, where girls from Urdu/Tamil speaking families were enrolled in the English medium sections, teachers found it difficult to teach because of the low learning levels of the students. They expressed their frustration about this and also pinned the blame on the poor teaching at primary schools. In general teachers at GBG opined that girls from Urdu/Tamil speaking backgrounds were unable to achieve as well as the girls who came from homes were Kannada was spoken. At PU, teachers referred to the "class mentalities" of parents while referring to students backgrounds. They spoke of parents who made the effort to send their children for extra tuition as being more aligned towards academic goals.

Thus in general, it was observed that teachers' explanations for student failure revolved around students' home backgrounds, lack of parental support, students' mental abilities and students' aptitudes and disposition towards

studies. Only 12% of the teachers explicitly referred to their own role in supporting student achievement. There was no common strand of belief about ability differences between boys and girls amongst teachers in the different schools, but some teachers at GAH felt that girls were more studious than boys and therefore were able to do better in the tests. The following section summarizes the findings about the actual work of science teaching that took place in different schools.

7.3 THE PEDAGOGIC DISCOURSE

As discussed Chapter 5, Bernstein (2000) defined the pedagogic discourse through the expression ID/RD, where ID represents the instructional discourse (discourse of competences relative to a given discipline or disciplinary area) and RD represents the regulative discourse (discourse of order, relation and identity). Beyond the production of the pedagogic discourse, the model also considers its reproduction, that is, the level of transmission. When inserted in this level, the official pedagogical discourse can be subjected to a new recontextualising, which depends on the specific context of each school and on the pedagogic practice of each teacher. Furthermore, the discourse which is reproduced in the school/classroom can also be influenced by the relations that are established between the school context and the context of the family/community. Thus, while suggesting that the school/ teachers have a reproducing function of the dominant principles of society, the model also highlights that the production and reproduction of the OPD, is a dynamic

process which offers possibilities of change (Morais, Neves & Fontinhas, 1999).

The regulative discourse of the classroom is the discourse which drives the principles of order, relation and identity. This chapter has discussed aspects of this discourse in the different schools. The pedagogic practices in the different schools differed in the power and control relations between students and teachers. According to Bernstein's theory, the power relations are analysed through the concept of classification (C) and the control relations are analysed through the concept of framing (F). In the first case, the analysis refers to the nature of the boundary between categories, which can be well marked (strong classification) or can be blurred (weak classification). In the second case, the analysis refers to the nature of the communication between categories, which can translate a control centred on the category which keeps the power (strong framing) or a control shared by the categories involved in the interaction (weak framing).

While discussing examples of classificatory principles for organising knowledge, Bernstein (2000,: p.7) refers to the medieval period where " there are two distinct differently specialised organisations of knowledge, one for the mental practice and one for manual practices, strongly classified, with strong insulation between these two, between mental practice and manual practice". In the context of the schools, the knowledge to be transmitted within the

school was kept distinct from the everyday knowledge present outside the school. Gayatri (GAH) explicitly acknowledged this separation while discussing the practical knowledge possessed by some of the students who did the work of winding transformers and her own "textbook knowledge" about transformers. This knowledge was strongly framed in the schools affiliated to the KSEEB – GAH, GBG and PU. Describing a more or less similar situation in a village near Delhi, Sarangapani writes,

> "The frame was detectable not so much in the presence or absence of everyday knowledge in the classroom, but more in whose and what knowledge became legitimised by entering into the classroom discourse. … The phrase 'textbook culture' refers to this strong framing of the curriculum and the conception of knowledge as received rather than constructed, which it supports and from which it is derived. In addition to framing knowledge, the epistemic functions of pedagogic discourse were also visible in the regulation and shaping of 'right answers' and the conduct of revision examinations."
> (Sarangapani, 2003: p.161)

The framing was weaker in the international school PI and some of the teachers, Sheela, Maya and Mohan for example, encouraged students to bring knowledge from their everyday world into the classroom discussions.

Here it is pertinent to mention that parents of students at the international school (PI) were upper class and had a high income. Some of them were themselves producers of knowledge as authors, software professionals, architects and designers. Parents of children from the government school were from the other end of the spectrum with low incomes and employed in manual labour. The knowledge of the upper class was valued and privileged both in society and within the school, whereas the reverse was true of the knowledge of the labour class.

The Position Paper on Teaching of Science explicitly suggests a weakening of the frame –

> "Can we help Janabai translate her rich understanding into formal concepts of biology? Can we convince her that school biology is not about some abstract world coded in long texts and difficult language: it is about the farm she works on, the animals she knows and takes care of, the woods that she walks through every day? Only then will Janabai truly learn science." (NCERT 2006, p.24)

The position paper also advocates a weak classification between disciplines at the upper primary and secondary stages. "Science content at the upper primary stage should not be governed by disciplinary approach…" (ibid p.23) and "At the secondary stage, the students should be engaged in learning science as a composite discipline…"

With respect to the subjects, taught all schools followed a strong classification where science was taught as a distinct area with its own set of curricular objectives. In all the schools, in standards VIII, IX and X, in all the schools, science was further divided into distinct disciplines: physics, chemistry and biology.

In the government schools, another form of classification was observed, namely the classification between secondary school and primary school. Despite being located within the same school complex, secondary and primary schools followed different timetables, had separate administrations and distinct sets of teachers. In the case of both the private schools, PU and PI, there was no separation between the primary and secondary school in terms of timetable, administration or teaching staff.

Strong classification also defined the role of the teacher (as transmitter of knowledge) and role of the student (as acquirer of knowledge) across all the schools. This is not surprising given the nature of the pedagogic device. Different syllabi legitimate differing power relationships between teachers and students.

> "In this analytical context, the attention is centred on the instructional practice which is indicated in the syllabus. According to the theoretical framework of reference, the instructional practice could be specified in terms of the discursive rules (selection, sequence, pacing, evaluation

criteria) which characterize that practice. To analyze the sociological message underlying the modality of instructional practice transmitted by the syllabus means, therefore, to analyze the control which is given to the teacher (transmitter) and to the student (acquirer), at the level of the various discursive rules which regulate the transmission-acquisition of the pedagogic discourse. If the syllabus legitimates an instructional practice where the discursive rules are controlled by the teacher, it transmits a sociological message in which the power of the teacher is explicit. In this case, we are in the presence of a theory of instruction of a didactical nature, centred on the transmitter. If, on the contrary, the syllabus legitimizes an instructional practice in which control is given to the student, on these rules, that syllabus transmits a sociological message in which the power of the teacher remains implicit. In this case, we are in presence of a theory of instruction of a self-regulative nature, centred on the acquirer. In any of these two situations, it is the transmitter, the category with higher hierarchical status, which keeps the power (the classification between the categories transmitter and acquirer is, therefore, strong). However, power can assume various forms in the pedagogic interaction, according to the greater or lesser control of the transmitter (strong or weak framing, respectively)." (Morais et al 1999 p.40-41).

As discussed in chapter 5, teachers in the government and private schools framed the syllabus strongly by controlling student movement, talk and also the pacing of the teaching. Thus these schools exhibited both strong classification and strong framing. However, in the international school, students had more control in the classroom as indicated by episodes such as the impromptu demonstration conducted by Meena in response to a student's inquiry, the several occasions where teachers had to reason with students to enter the classrooms and begin their lessons and the free-flowing discussion about conservation observed in Mohan's classroom. This school could, therefore, be said to have strong classification but weak framing. As discussed in chapter 3, this school was affiliated to two boards, the CIE and the CISCE and these syllabi seemed to legitimate instructional practices that had weaker framing, allowing students to express their feelings and seek clarifications from the teacher in the classroom.

It was observed that in the government schools and the private unaided school (PU), the teaching practices themselves were strongly classified in terms of explanations, note-giving and revision. Teachers in these schools maintained these distinctions to a greater or lesser degree. The importance given to each of these practices differed across the schools. In the government schools, highest importance was given to note-giving. As discussed in chapter 5 teachers, when short of time, would prioritise note-giving over explanation. In the private unaided school, the explanatory phase of the lesson invariably

preceded the other phases of the lesson. On the other hand, when short of time, teachers at PU, did not curtail or do away with the explanatory phase of the lesson, but chose to utilise additional periods allotted for other activities for giving notes to the students. At the international school, the teaching practices were not thus classified into explanations, note-giving and revision. In the case of standard VI at PI, it was observed that student activity was classified into "desk-work" and "discussion". During "desk-work" students were seated at their desks and received instruction that involved some degree of writing and use of textbooks. During "discussion", students moved to a carpeted area and sat loosely in a circle while participating in a teacher-led group discussion related to the lesson being taught.

Chapter 5 discussed how classroom instruction is embedded in the regulative context. Teachers across schools used several strategies to control and direct students' action and also students' use of instructional material such as textbooks and notebooks. In the government schools and the private school (PU) where instructional practices were strongly classified, the framing was also strong and students were trained to behave appropriately according to the phase of the lesson – not referring to textbooks during the explanation phase, copying in their neat notebooks during the note-giving phase and reproducing the appropriate texts verbally or in writing during the revision phase. The power of the teacher was explicit and the instruction that was legitimised in these classrooms was of a didactical nature mainly concerned with the

transmission of knowledge encoded in the textbooks. The effectiveness of the transmission was evaluated in the written tests and examinations which required students to reproduce the answers dictated to them by their teachers during classroom instruction and which they had been drilled to reproduce during the revision phase of the lesson. The official recontextualisation field of the Karnataka State was thus not in alignment with the recontextualisation being attempted by the NCERT through the National Curriculum Framework (NCERT, 2005). It may be argued that the National Curriculum Framework is attempting to move pedagogy towards weaker classification and weaker framing as indicated by the statements about science education quoted earlier in this section. A detailed analysis of the National Curriculum Framework using the theoretical framework of Bernstein (1990, 1996) is beyond the scope of this study.

Morais & Antunes (1994) reported a small but careful and insightful study that examined the relationship between student achievement and the regulative discourse of the classroom. Their analysis suggests that there is an interrelation between family and school to produce children's differential achievement in a specific regulative context. "Particularly it seems that family and school pedagogic practices are deeply interrelated in giving a child the possibility to be a good or poor achiever" (ibid p.260). The study examined the socialisation of children at home and then examined their ability to acquire the rules of the regulative discourse in the classroom and related these two

aspects to the students' achievement in the classroom. The importance of the research to this discussion is that it points to the complex interrelationship between home backgrounds, classroom regulative context and student achievement. Broadly speaking, the schools affiliated to the KSEEB, whether government or private, had similar regulative contexts in the classroom, but the home socialisation of students was different and could be one of the reasons why there was a marked difference between the average achievement in science of students from the government school and those from the private school. This difference in achievement across schools has been discussed in chapter 3. Morais & Antunes (1994) discuss the desirability of devising differential pedagogic practices which are in a relation of continuity with the family socialisation, but do not offer a definitive conclusion on this topic, saying,

> "However, if we want children to go beyond simple socio-affective competencies developing competencies of a higher order, like cooperation and participation, we must create conditions in the classroom for that development. This means to change the power and control relations in the classroom, namely through explicating the evaluation criteria, so that children can acquire the required specific coding orientation and socio-affective dispositions. This is clearly an ideological option." (ibid, p. 261)

The importance of the regulative context of science classrooms becomes clear when we look at literature about science education and learning sciences.

> "What the learning sciences literature tells us is that the structure of knowledge and the processes of knowing and learning are much more nuanced than initially described by associative and behavioral learning theories. That is, context and content matter. Thus, there is a general move away from an emphasis on domain-general reasoning and skill development to domain-specific reasoning and practices development. The richer understanding of learning and reasoning that domain-specific contexts provide has significant implications for the design of pedagogical models and learning environments" (Duschl 2008, p.271).

In a review article titled "The Psychology of Learning: A Short History," Bruner (2004: p.20) concludes, "It was the cognitive revolution that brought down [associative and behavioural] learning theory." Cognitive psychologists claim that learning is shaped by experiences, by the sequencing of those experiences, and by careful mediation directed toward learning goals (Lehrer & Schauble, 2006; Rogoff, 1990). Work that has emerged from earlier constructivist theories of learning and from research in the cognitive science has led to deeper understandings of children's thinking, expert thinking, representation, reflection and problem-solving. The classroom

implication of these researches has been summed up thus, "Students learn deeper knowledge when they engage in activities that are similar to the everyday activities of professionals who work in a discipline" (Sawyer, 2006, p.4). Research on informal learning has brought out the importance of participation structures and the development of practices in culturally-valued activities (Cole, 1996).

Studies on the development of expertise among knowledge workers, for example, scientists, engineers and medical doctors using approaches from cognitive, historical, sociological and anthropological perspectives have shown the importance of practices that are central to the professional activities in the knowledge growth communities. Research on epistemic cultures of scientific disciplines (Giere, 1988; Goldman, 1986; Kitcher, 1993; Thagard, 1992) on the one hand, and socio-cultural studies of science, on the other, (Knorr- Cetina 1999; T. Kuhn, 1962/1996) have drawn attention to the importance of models, mechanisms and peer interactions in the development and growth of scientific knowledge.

> "Science takes place in complex settings of cognitive, epistemic, and social practices. The implication for science learning is that more and more contemporary science is being done at the boundaries of disciplines. Thus, there is a connectedness in the practices of science

that are not typically found in school classroom environments" (Duschl 2008, p.273).

Chapter 5 has discussed the strong classification between science and other school subjects and within the various sub-disciplines of science in the secondary school .This observation seen in the light of recent researches in the development of scientific understanding points to the need for rethinking the school curriculum and weakening the existing strong classification between subjects.

One of the important findings from the science studies literature is that not only does scientific knowledge change with time, but so, too, do the methods of inquiry and the criteria for the evaluation of knowledge change. The accretion growth model of scientific knowledge is no longer tenable. Nor is a model of the growth of knowledge that appeals to changes in theory commitments alone, for example, a conceptual change model. Changes in research programs that drive the growth of scientific knowledge also can be because of changes in methodological commitments or goal commitments (Duschl, 1990). Science studies examining contemporary science practices recognise that both the conceptual frameworks and the methodological practices of science have changed with time. Changes in methodology are a consequence of new tools, new technologies, and new explanatory models and theories that, in turn, have shaped and will continue to shape scientific

knowledge and scientific practices. The emerging view of science is that it involves the following epistemic and social practices;

- Building theories and models
- Constructing arguments
- Using specialised ways of talking, writing, and representing phenomena (Duschl,2008)

What was observed across all the schools was the presentation of science as an accretion of facts based on theory-independent empirical observations. Teachers' use of demonstrations to illustrate or "prove" a "scientific fact" was in keeping with this view of science.

In the context of science education in the US, Duschl (2008) mentions the shift in view about the nature of science from science as experimentation to science as explanation and model building. In other words, this implies a shift away from the conception of scientific inquiry as an individualistic process to scientific inquiry as an individual and social process. The concomitant shift in science education has been to move from science teaching that focused on the management of learners' behaviours and hands-on materials to science teaching focusing on the management of learner's ideas, access to information, and interactions between learners. In this study it was found that the schools with the KSEEB – GA, GB and PU - curriculum implicitly supported a view of science as an accretion of knowledge and

legitimised pedagogy based on behaviourist learning theories. These theories continue to hold sway in the professional training colleges for teachers and this has been discussed in Chapter 6. In the case of the National Curriculum Framework 2005, there has been a thrust towards inquiry-based approaches, but no significant reflection can be seen of the recent developments in the learning sciences and science studies.

Synthesising the learning sciences research and science studies research, Duschl (2008) suggests that science education should focus on three domains: conceptual and cognitive processes; epistemic frameworks and; social processes that shape how knowledge is communicated, represented, argued and debated.

The cognitive, social, and cultural dynamics of learning intertwine such that "you cannot strip learning of its content, nor study it in a 'neutral' context. It is always situated, always related to some ongoing enterprise" (Bruner 2004, p.20). The history of science education in western nations since World War II contains many attempts to move instruction away from textbooks and lectures to investigations and experiments (Rudolph, 2002, 2005). Major curriculum renewal programmes in science in India have also evolved in keeping with trends elsewhere in the world. Several innovative programmes have been operational since the 1980s, by the government as well as by external agencies, for reforming school education including science

teaching. As per the position paper on science teaching (NCERT 2005), reforms in Science education have been attempted by organisations like the Homi Bhabha Centre for Science Education (HBCSE), Hoshangabad Science Teaching Programme, Lok Jumbish Parishad and also through macro-level interventions like the District Primary Education Programme managed by the government. "All of these programmes fostered an activity-based, learner-oriented pedagogy in which the child was encouraged to build on her own experiences and learn from her environment" (NCERT Position Paper on Science Teaching, p.10). These shifts both nationally and internationally represent a shift from strongly-framed curricula towards weakly-framed curricula which enable greater learner control. However, as discussed in chapter 5, actual classroom practices were still strongly framed across the schools and there was little or no conversation between students and teachers in the science classroom, with a few exceptions being seen in the case of the international school PI. The pedagogic relationship was not a dialogic relationship, but instead the teacher was a relay of knowledge that was to be reproduced by the student.

The call for conversation in the science classroom stems from a recognition of the value and importance that representation, communication, and evaluation play in science learning. Duschl (2008) uses the term 'conversation' in a broad sense to include among other ideas, argumentation, debate, modelling, drawing, writing, and other genres of language. Research

by E. van Zee and Minstrell (1997) shows gains in learning that result from shifting of authority in classroom conversation from teacher to the students. Herrenhkohl & Guerra (1998) showed that it was possible to enhance student 'thinking science' by supporting productive community discourse in the classroom. Bringing about such a deliberate process of dialogue and inter-student communication about science would necessarily involve a complete reframing of the regulative discourse that is prevalent in the classrooms.

However, the study by Morais & Antunes discussed above suggests that altering the regulative context of classrooms may have differential effects on students depending on the students' home socialisation. Thus, while recent research on science learning from many different strands points towards the need to change the regulative context of the science classroom in order to promote student thinking in science, it would be unwise to advocate a uniform pedagogy across different school contexts.

7.4 TEACHER PREPARATION

The pedagogic practices are part of the pedagogic recontextualising field (PRF) and can affect the pedagogic discourse independently of the official recontextualising field. The (PRF) has a degree of autonomy due to the agency of teachers. Chapters 4 and 5 examined individual teacher biographies and praxis as constituents of the PRF. It can be argued that teacher preparation programmes shape teacher praxis to varying degrees and Chapter 7 discussed

the role of teacher preparation programmes in shaping the pedagogic practices of teachers.

Both teachers and student-teachers in this study seemed to consider their experience of practice teaching as being only marginally relevant to their eventual work as teachers. When asked for their views on the pre-service training that they had undergone, 70 percent of the teachers said that they had not found it useful. In general teachers valued the experience of practice teaching that formed a part of the pre-service training and felt that the theory portions of the program were not very relevant. Across schools, teachers felt that the type of teaching methods that they learnt during their pre-service training was removed from the methods that they used in their actual work as teachers. Teachers in government primary schools were exposed to several in-service training workshops, especially after the launch of the Sarva Shiksha Abhiyan programme for the universalization of quality elementary education by the government of India. Teachers' general opinion about these programmes was that they were not very relevant to their daily practice as class-room teachers. At PU, teachers were very focused towards getting students to do well in the examinations and felt that training about strategies to help low achievers would be valuable. Teachers at PU did not have opportunities to attend in-service training programmes. At PI, the teachers had a system of in-house orientation and mentoring that they found to be highly useful. The newer teachers at PI said that they gained new perspectives about

teaching and learnt the latest methods about teaching through the in-house system. One of the relatively new science teachers felt that she had space to try out innovative ideas in her teaching at PI.

Student teaching occupies a significant space in teacher education programmes. During the initial experience of practice teaching, ideal images are confronted with the demands of reality. The novice teacher must demonstrate her skills under the scrutiny of the supervising teacher. Often the focus of this supervision is the student-teacher's ability to successfully manage the class. Zeichner and Tabachnik (1981) showed how educational ideas developed during pre-service teacher education are “washed out” during field experiences. Lack of transfer from teacher education to practice has been summarised in reviews by Feiman- Nemser (1990) and Wideen, Mayer-Smith, and Moon (1998).

As discussed in Chapter 6, a majority of the science student-teachers who were interviewed in this study were from rural areas of Karnataka. A few students were from rural Tamil Nadu and one student-teacher was from Rajasthan. Many of the student teachers were not fluent in English; however, the general practice was to send student-teachers who had opted for science to teach in private English medium schools.

D. Ed students who came for a three month school internship in the second year of their program were left unsupervised at GBP. At PU, the set of

D. Ed students who came for internship met with a supervising faculty member from the college once during the day. However their teaching was not observed by the supervising faculty, nor were they mentored by the regular teachers. The D. Ed students did not have a fixed number of lessons that they needed to teach, but were expected to take on whatever teaching responsibility that was given to them by the school were they went for internship. B. Ed students on the other hand had to go prepared with elaborate lesson plans and their teaching practice was observed by faculty as well as peers.

In Chapter 6, five aspects apparent in the practice teaching component of teacher education programmes, were discussed :– the hiatus between theory and practice , the establishment of teachers' authority over students; the focus on the form of the lesson rather than the content; the dissonance between the official recontextualising field and the pedagogic recontextualising field in the case of science education; and the non-cognisance of student diversity in the teacher preparation programmes.

Practice teaching in the three schools was relatively insulated from the work of regular teaching. Student-teachers had a much smaller teaching load than in-service teachers. They were not held accountable for student learning in the same way that in-service teachers were. Practice teaching did not have the nature of apprenticeship as student-teachers did not work alongside the experienced teachers, nor even interact significantly with them. Kumar

(2002) highlighted the difference between a medical internship and the practice teaching component by pointing out that student-teachers had a much lighter work load compared to regular teachers whereas the medical intern had a load that was higher than that of a regular practitioner. At PU, B. Ed students had to teach a single period a day, whereas a teacher on the job in the same school was expected to handle between five to seven periods on any given day. The student-teacher's life at school was envisaged quite differently from that of a regular teacher. The B. Ed and D. Ed programs did not build links between practice teaching and regular teaching. The teacher training programs also seemed to be disconnected from other aspects of the system of education such as the running of schools, the planning of curriculum and the preparation of textbooks (Kumar, 2002).

During practice teaching, an overwhelming concern for student-teachers was to manage student behaviour and in this they were assisted by class leaders, peers or faculty from the teaching colleges. Student-teachers seemed anxious about the criticisms from the observing faculty if they felt under-confident about their ability to maintain "class-control". In the government high school, GAH, student-teachers were made to experience the importance of establishing the absolute dominance of the teacher by physical means if necessary. In GAH and GBP, teachers maintained tight control over student talk, movement and action whenever they were present in the classroom and this was something that had to be learned by student-teachers in

order to be judged as effective at ‘class-control’. This was true at the private school too with the difference that hitting of children was not used as a method of control. Thus, student-teachers were socialized into a custodial pupil control orientation through which school is conceived as an autocratic organisation with a rigid pupil-teacher status hierarchy (Hoy and Woolfolk, 1990, p.281).

Another significant observation about practice teaching discussed in Chapter 7 was the relatively low importance given to the content of the lesson taught during practice teaching. Little reference was made to issues pertaining to the development of conceptual understanding of science-related topics amongst the children. Subject specific comments were rarely given to student-teachers during the feedback sessions and much more importance was given to the form of instructional delivery. Lessons were scripted during planning and delivered according to the script. Student-teachers were seen memorizing the content that they would speak in the class especially in the case of those who were not very fluent in English.

Student-teachers assigned to different schools for practice teaching received the same kind of instruction from the faculty for their lesson plans. The underlying assumption behind the lesson plans ritually written and transacted by the student-teachers was that children are recipients of knowledge as encoded in the textbooks. The role of the teacher is seen as a

transmitter of knowledge. This assumption was also implicit in the teachers' praxis observed in the government schools, the private unaided school and to some degree, in the international school. Thus it was possible to observe the homonymy between the pre-service teacher training and in-service teaching and how they constituted the pedagogic recontextualisation field as theorised by Bernstein (2000).

These notions about children, present in the pedagogic recontextualisation field were not consonant with the ideals of science education as expressed in the National Curriculum Framework (NCERT 2005) according to which children are active learners who constructed knowledge based on inquiry and experiments. Thus the pedagogic recontextualising field as constituted by the teachers and the teacher training colleges is in conflict with the stated goals and objectives of the curricular reforms suggested by the official recontextualising field constituted by the state level bodies like the DSERT as well as by the national-level organisations like the NCERT where a shift to more constructivist pedagogies has been recommended.

Teacher education programmes did not encourage student-teachers to differentiate lesson plans according to the needs of students in different schools. Lesson plans were based upon assumptions of learner characteristics and student teachers were not required to engage with children in school in ways other than teaching them forma structured lessons. Practice teaching was

evaluated against a fixed ideal of a model lesson that did take sufficient cognizance of the classroom context. Student-teachers' notions about how different children learnt were not called to question during their practice teaching. Thus it would have allowed the perpetuation of popular stereo-types about individual student's ability being the main determinant to his or her success in school.

7.5 UNEQUAL SCHOOLS CREATE UNEQUAL OPPORTUNITIES IN SCIENCE

Teaching styles across the schools had similarities as well as differences. These could be ascribed to personal, institutional and sociological factors. The similarities point to the autonomy of the pedagogic recontextualization field. The life histories of teachers showed that teachers tended to stay within the bounds of school types that they had experienced as students. All the science teachers in the government schools, GA and GB had studied in government schools themselves and this indicated that these teachers came from lower socio-economic or rural backgrounds, since government schools were predominantly schools for the poor or disadvantages, as discussed in chapter 1. The biographies of teachers also clearly showed that teachers in government schools had come from homes with modest incomes. 80 percent of the science teachers in PU which was affiliated to, KSEEB, the local state board, also had studied in government schools. However, all the science teachers

who taught at PI had studied in private schools affiliated to one of the national boards of secondary education. The PI was also affiliated to one of these national boards, the CISE.

The teacher training colleges reinforced this positioning of teachers in different school types by allocating trainee teachers to schools that accorded with the trainees' backgrounds. Language played a role in determining which student teacher got sent to which school. Student teachers who only spoke Kannada and had studied in government schools themselves were sent to the government schools for their teaching practice and their socialization as professionals occurred within the institution framework of government schooling.

Clarke (2003) referred to differences in the pedagogy of teachers in different countries and to similarities within a country. She suggested that in addition to a variety of factors related to economic, political and demographic context that account for the differences, teacher thinking and action, whether tacit or explicit, is constructed by the culture that surrounds teachers. In addition to their professional knowledge usually acquired during pre-service training, teachers use their lived and lifelong experience in a specific community and culture to construct their thinking and action in the classroom. The culture in which schools in a country or state are located and which teachers and pupils share, influences the character of school and classroom life

as much as the specific school characteristics, local circumstances and interpersonal chemistries which make one school or classroom different from another. Culture has a bearing on what goes on in classrooms, "…from what you see on the walls to what you cannot see going on inside children's heads." (Alexander, 2001 p.266)

Models that teachers hold are developed through being a child, student and parent in a particular culture. Sarangapani (2003, p. 101) showed how teachers, children and the community shared beliefs about the nature of childhood and growing up, which seemed to support the centrality of 'discipline' in the process of schooling. Although Bernstein's theory of the pedagogic device is essentially a sociological one, the limited autonomy of the PRF allows us to see where the sociological may interact with the cultural within the classroom.

The differences in the working conditions of the teachers in the different schools impacted upon their effectiveness as teachers, both in terms of student achievement and in their own self-perceptions. As has been pointed out, teachers in public schools faced a number of issues and they have been compared to street –level bureaucrats (Lipsky, 1980, Anagnostopoulos, 2003). Teachers across schools located sources of students' achievement or failure in the students or their socio-economic or ethnic backgrounds. However, teachers in government schools worked with students from a class background that in

general did not achieve as well as students from higher socio-economic backgrounds. The curriculum followed in the private school and the government schools were the same and so was the examination that they sat for. Teachers in the government schools however, had to work under circumstances that differed considerably from those working in the private school. Despite being paid substantially better than teachers in the private school, government school teachers often expressed their frustration and lack of satisfaction with their work.

Three peculiarities were evident in the work of government school teachers, the lack of voluntarism in the teacher-student relationship, the unpredictable composition of their classes and the demand for personal accountability over student achievement. The lack of voluntarism in teacher-student relationship occurred due to the fact that teachers in government schools had no control over who entered the schools, but on the other hand were held accountable for ensuring attendance of the students who had been enrolled. Teachers had to personally go on enrollment drives and in some instances there was active resistance on the part of the families of students who were eligible for entering school. Difficult family circumstances also resulted in children staying away from school and again teachers were held accountable for these absentee children. Yet, teachers reported satisfaction derived from developing strong interpersonal bonds with students and students reciprocally appreciated this relationship. Teachers had to deal with students

entering school for the first time at various ages and were not in a position to control the time interval required by the newly enrolled students to come up to age appropriate levels of competencies required for succeeding in school. This put teachers in an impossible bind of having to enroll students at various ages and then having to make them ready for age appropriate standards in a time frame mandated by the state education department and finally pull off the trick of managing the required proportion of passes in the district level examinations. The high degree of insulation meant that, high school teachers regularly blamed the poor teaching in primary schools for the poor standards of the students entering the high school.

The government primary school teachers had limited preparation for teaching science as neither the general education received by these teachers nor the teacher training course that they had to undergo allowed them to reflect in any depth about science and science teaching . The teachers themselves had studied in government schools and therefore subject to the similar teaching methods as they themselves practiced. The ineffectiveness of teacher training was widely commented upon by all the teachers.

The recent move to allow specialization of students training to teach science at the higher primary level is curious as it requires that students who want to teach science also opt to teach English. It is commonly held that English allows students easier entry into institutions of higher education.

College level teaching occurs mainly in English and several high school science teachers mentioned their initial difficulties in mastering this language while studying for their science degrees. Usage of English shows a clear class pattern and the association of science with English reflects this class association between the two school subjects. The relationship between the subjects is determined by the recontextualization field (Bernstein, 2000).

There was no provision for in-service training in science teaching for primary teachers despite a large training budget being available under the present government programmes for improving elementary education. There was a separate budgetary provision in the DSERT for improving science education, but this was geared towards promotion of science fairs and exhibitions at the high school level. Thus the state does not see the need to address science teaching at the primary level separately. Improving science education at the high school level seems to be envisaged largely as a matter of science popularization independent of classroom teaching.

The student in the government school was thus placed in an institution, which was under resourced and taught science by inadequately trained teachers. The teachers themselves were subject to unreasonable work pressures that led them to develop defensive strategies in order to survive and this impacted adversely on the quality of instruction. Despite this, the

headmistress of the primary school reported that over ninety percent of students from the primary school went on to join the high school.

The two government high schools observed in this study faced somewhat different issues. GAH had very high student strengths of over seventy students per section and this made it difficult for teachers to effectively check student work. At GBG the most frequently mentioned problem was connected to the language/ethnic background of the students. The test scores showed that students from Tamil or Urdu backgrounds were faring poorly and teachers blamed this on their lack of familiarity with English. However in the classrooms, teachers used Kannada to repeat explanations given in English and also to give instructions and converse with the students. During the parent interactions it was observed that several parents were unable to communicate with the teachers who spoke to them in Kannada. Teachers felt that the government policy of allowing parents of non-Kannada speaking students to opt for education in English was ill-advised. As has been discussed, teachers in the government schools were also subject to several contingencies and this resulted in their inability and unwillingness to plan their sequence of lessons to any significant extent.

Students in the private school were taught English from first standard or earlier as this was the key distinction between private schools and government schools. The government's policy of disallowing private schools

to teach English before students entered the fifth standard was circumvented by the school by obtaining permission to seek affiliation from the CISCE board. Teachers in this school were poorly paid, but in other matters expressed satisfaction with their work conditions. Unlike the teachers in government schools they did not feel constrained by difficult work conditions and were able to plan the sequence and pacing of lessons, but expressed that they felt the curricular load was too high to teach for understanding. In this manner they justified their giving of notes and rote like drilling during revision periods. Teachers in this school attributed student failure to lack of parental involvement in their children's education.

In the international school teachers were positive in their expectations from the students. Teachers were confident that students would be adequately supported in their studies by their parents and also that they could rely on parental involvement to supplement classroom teaching.. The school was very well resourced in terms of infrastructure and staffing.

At the level of classroom processes there were significant differences among the classification and framing in each of the school types. The strong classification of school types and in the special case of the government schools between primary and secondary schools thus located pupils and teachers within a school type or level.

Strong frames reduce power of the pupil over what, when and how he receives knowledge, and increase the teacher's power in the pedagogical relationship. At the same time strong classification reduces the power of the teacher over what he transmits, as he may not overstep the boundary between contents, and strong classification reduces the power of the teacher vis-à-vis the boundary maintainers i.e; the ORF. In the government schools both strong framing and strong classification are noticed, thus curtailing the powers of the teachers and the taught. What is transmitted is severely restricted and thus reduces the meaning potential available for the students to acquire the realization rules of a particular subject. (Bernstein 2000. p. 16)

In the private school, PU, also there was strong classification and strong framing in terms of school subjects. The classification between high school and primary school sections was weak and allowed teachers to teach in both sections and also to learn from each other to some extent. Sivaraj allowed more student interaction, whereas classes taught by Savitri were more tightly framed. The pacing was regulated in such a way as to allow more transaction time and this allowed a loosening of the frame, unlike government schools where the actual transaction time for lessons were curtailed for a variety of reasons, both systemic and individual. Curtailment of transaction time further tightened the frame by forcing the pacing of the content to be fitted into lesser number of periods actually available for teaching..

In the international school there was fairly strong classification among the school subjects, but the framing was loose allowing students a greater degree of power over what, when and how they receive knowledge. The classification between high school and primary school was weak like in the private school permitting teachers to learn from each other. Pacing was also relatively weak as the curriculum in the standards preceding standard IX was planned at the level of the school and did not have to adhere to an externally given time frame.

Bernstein repeatedly argued that successful learning depends to a great extent on the weak framing of pacing-that is, on conditions where children have some control over the time of their acquisition. This has generally been politically unacceptable, since it raises the cost of education. For that reason, only those children who have access to a second site of acquisition (the family) have been likely to succeed (Morais, 2002). Thus it becomes evident that given the tight framing of pacing in the government schools and the private schools, the availability of support from the family becomes a decisive factor in student success. This is what has been reiterated by the teachers. To hold teachers solely accountable for lack of student achievement is therefore unjustified.

As discussed in section 7.3 of this chapter, the National Curriculum Framework 2005 (NCERT, 2005) has provided directives towards a

weakening of the framing of classroom processes and argued for less control over students. The PRF which is in part constituted by the teacher training programmes is not in consonance with this as discussed in section 7.4 and as pointed out by Batra (2009). The current National Curriculum Framework for Teacher Education (NCTE 2009) that seeks to align teacher education programs more closely with the NCF 2005 suggests an attempt to weaken the autonomy of the PRF and bring it closer to the ORF. If this process gains impetus it could have a positive effect on science learning for children from disadvantaged groups. However, since teacher education programs are only one of the constituents of the PRF, it would need a concerted effort at many levels to alter the present PRF. What needs to be kept in mind is stability of the pedagogic device and the characteristic of the recontextualizing field that has a crucial function in creating the fundamental autonomy of education. The recontextualizing principle not only recontextualised the content of pedagogic practice – *the what* – but also*;* that is the theory of instruction. The theory of instruction contains within itself a model of the learner and of the teacher and of the relation. The recontextualizing principle selects both the *what* and the *how* of the theory of instruction. Both are elements of the pedagogic discourse (Bernstein 2000, p.35). The theory of instruction is derived from the socio-cultural as well as the pedagogic experiences of individual teachers (discussed in Chapters 5 and 6) and forms part of their habitus. Therefore the implications

are that in order to achieve change in teacher praxis we need to confront the issue of habitus transformation.

7.6 Socio-Cultural Bases For Teacher Change

This study has indicated that although the private school, PU and the government schools GA and GB were within the same official recontextualization field constituted by the various bodies under the Karnataka state's department of education – the Directorate of Public Instruction, the Directorate of Education Research and Training, the Karnataka State Education Examination Board – they differed in terms of student profile and infrastructural provisioning.As discussed in Chapter 3, this study has pointed out the lack of adequate classroom space, laboratories and seating arrangements for students in the government schools. An improvement in the infrastructure could have a positive effect on student achievement as indicated by other research in the Indian context (Kingdon, 1998). In the case of GBG, it was found that students whose home language was Urdu or Tamil and were enrolled for English medium instruction, performed poorly as they had inadequate skills in English and were unable to comprehend fully the teachers' explanations in Kannada. One may surmise, therefore that students from non-Kannada speaking homes could be helped to do better at school if they received language support at school

The pedagogic processes followed in GA, GB and PU were broadly similar, as discussed in chapter 5, but the students in government schools received less classroom instruction as the teachers in these schools were tasked with several non-teaching responsibilities, had to attend meetings at short notice and could also avail of various forms of leave during the academic year. Classroom teaching in the government schools was interrupted or disturbed more often than at the private schools, further decreasing the instructional time available for students in these schools. It was observed that the, teachers used the teachering device to draw students' attention to information from the textbook that was to be remembered and reproduced during oral quizzing and also in the written tests. Teachers drilled students in learning the content of 'notes' that were given to the students in the form of answers to questions. Even without major changes in the ORF (through curricular reforms or revised textbooks) or the PRF in GA, GB and PU, it is very probable that the students in the government schools would perform better if they received more classroom teaching and also if the teaching was not subject to various

disturbances. Evidence from correlation studies in education in urban India also indicates that increased instructional time is an important variable for improving student achievement (Kingdon 1998). In the context of government schools in Bangalore, the policy of making government school teachers carry out non-teaching work outside the school and of requiring them to attend

meetings or training workshops during the academic term needs to be changed in order to ensure adequate availability of teaching time for the students.

The ORF in which the international school functioned differed from the other schools, since this school was affiliated to the CISCE and the CIE boards and not the KSEEB. In comparison to the other schools observed in this study, the teachers and students in this school had access to better equipped laboratories and other educational resources. Although the teachers in this school also used textbooks for teaching (discussed in Chapter 5), they did not use the 'teachering device' to make students learn content from the textbooks, nor did they give notes. There was a greater degree of student interaction in this school, although the extent of this varied, depending on the teacher and the type of lesson. Students in this school had opportunities to learn through projects and also had opportunities to perform experiments regularly as this was required by both the CISCE and the CIE curricula. In contrast, students in GA, GB and PU did not carry out experiments and only the teachers were observed demonstrating scientific phenomena through experiments on a few occasions. Thus one may conclude that the official recontextualization field influences the classroom processes. The evaluative rules of the ORF in which the PI functioned did not emphasize students' ability to recall knowledge from textbooks unlike the ORF in which the other schools functioned. This aspect may also have influenced the way teachers taught at PI.

In the ORF, official pedagogic discourse is produced in the forms of national and state policy documents and statements, and state- endorsed curricula (Bourne, 2008). In the case of schools affiliated to the KSEEB, the text-books were also prescribed by the state and therefore formed a part of the ORF, whereas the ORF in which the international school functioned allowed a greater degree of autonomy to the school in choosing textbooks. Through the process of recontextualization at the macro level, certain forms of knowledge are legitimated over others, and certain types of pedagogy are privileged over others. In general, both the ORFs legitimated knowledge that had been validated by formally recognized processes associated with universities, departments of education and publishing processes. As a consequence, the knowledge available with the working class communities to which students in the government schools belonged, did not find a place in the pedagogic discourse within the classrooms and the teaching processes did not allow these students to relate their everyday knowledge to what was taught in the classrooms. As discussed earlier, there is a move at the national level to allow the students' everyday knowledge space to enter discourse of the classroom. The National Curriculum Framework says, " Our children need to feel that each one of them, their homes, communities, languages and cultures, are valuable as resources for experience to be analysed and enquired into at school;…" (NCERT, 2005, p.13). At the level of the Karnataka state level, this notion does not find a clear articulation in the ORF. This points to a degree of

insulation between the ORF at the national and state levels. It is beyond the scope of this research to analyse the extent of coherence between the ORF at the national level and that at the state level.

However, it is arguable whether a change in the ORF at the state level by itself would be sufficient to bring about a change in the pedagogic discourse in such a way as to enable students from low socio-economic backgrounds to actively engage with the concepts and processes of science in ways that would raise their achievement in the subject. The pedagogic discourse in the classroom is not solely determined by the ORF (Bernstein, 2000), but it is also a result of the pedagogic recontextualization field, the PRF. The recontextualization that occurs in the ORF is transformed by teachers who are agents in the PRF. The existence of the ORF and PRF suggests possibilities for conflict, resistance and inertia both within and between these fields. Whilst official pedagogic field may work to establish ideological coherence within the recontextualising field, the local pedagogic field may align to show compliance, or oppose or resist to maintain its local integrity (Bernstein, 2000).

The PRF is comprised of: (1) university departments of education, together with their research; and (2) 'specialized media of education, weeklies, journals, and publishing houses together with their readers and advisers' (Bernstein, 1990: 192). The PRF may also 'extend to fields not specialized in

educational discourse and its practices, but which are able to exert influence both on the State and its various arrangements and/or upon special sites, agents and practices within education'(Bernstein, 1990: 192). What could be included in this formulation of the PRF are the cultural resources that influence teacher praxis as discussed earlier and as in the works of other researchers – Sarangapani (2003), Clarke (2003) and Alexander (2000).

The observations of teacher preparation programmes in the course of this study have shown how these are insulated and discordant with the ORF as articulated in the National Curriculum Framework (NCERT, 2005). The Position paper on Teaching of Science (NCERT, 2006) advocates a curricular approach that favours discussion and experimentation. "Clearly for experiment based science learning to be effective, there must be space and time for teachers and students to plan experiments, discuss ideas, and critically record and analyze observations. A good pedagogy must essentially be a judicious mix of approaches, with the inquiry approach being one of them." (NCERT, 2006, p.5)

Section 7.4 of this chapter has discussed research that showed that science curriculum that involves students in dialogue, inquiry and experimentation can bring about a more equitable learning of science wherein students from diverse backgrounds are able to learn science successfully and thus enabled to take up science related studies after school. Chapters 5 showed that teachers in most classroom situations did not allow for discussion and

dialogue with students. Exceptions to this were observed only in PI, where students from affluent backgrounds studied. Chapter 6 discussed the observations of the practice teaching done during pre-service teacher training courses and showed how student-teachers were trained to deliver fixed lesson content that did not provide space for open ended inquiry and discussion in the classroom. By synthesising these observations it is possible to conclude that for teachers to enact science curricula in ways that promote deep conceptual understanding, a major change in the regulative discourse of the classroom is required alongside curricular reforms. In the present PRF, the regulative discourse of the classroom supports teacher lead didactic praxis that is focused on delivery of textbook content and transmits evaluative criteria that encourage students to reproduce this content without requiring them to display a deeper understanding of scientific concepts and their application to the everyday world. There is a pedagogical culture that supports intersubjectively the notion of the teacher as a transmitter of knowledge as encoded by the agencies/institutions in the ORF.

The interaction of different ORF with teachers' personal biographies seems to engender the dispositions or habitus of teachers, who are agents within the PRF. According to the theorizing of Bourdieu, the habitus is a central construct which aligns closely with identity. "The habitus is a system of durable, transposable dispositions", which predispose the participant to act, think and behave in particular ways (Bourdieu, 1979). The habitus is a product

of history which is both a product of and produces individual and collective practices. The habitus with which one enters a particular context can reshape practices within that context. Thus, there is a mutual constitution of both habitus and context. Mills and Gale (2002) suggest two types of habitus – reproductive and transformative. Those with a reproductive habitus feel constrained by their circumstances and tend to take their social world for granted and confine possibilities to those they see as suitable for the social group they belong. On the other hand those with a transformative habitus, recognise the capacity for improvisation and tend to look for opportunities for action in the social field (Mills, C., & Gale, T. 2002).

The primary teaching habitus of pre-service teachers has been shaped by the twelve or more years of schooling where they have been enculturated into what constitutes appropriate ways of being within that context (Zevenbergen, 2006a). As discussed in section 7.2, teachers' habitus lead them to work within ORF that more or less matched the ORF in which they had studied. The pre-service colleges of education supported the tendency of teachers' to maintain their habitus by sending student-teachers to do their practicum in schools that functioned in the ORF similar to the ones in which they had studied in (discussed in Chapter 6).

Irrespective of which schools they are assigned to for practice teaching, student-teachers received the same kind of instruction from the faculty for their lesson plans. The possibility of different learners having

different learning needs was not considered at any time in the teacher education programmes. Student teachers' notions of what constitutes effective teaching and their notions about the relationship between children's socio-economic backgrounds and school achievement were not called to question during their practice teaching allowing the perpetuation of popular stereo-types about individual student's ability being the main determinant to his or her success in school. As a result of this, the PRF of the teacher education colleges and that of schools supports a reproductive habitus.

If curricular reform processes require teachers to substantially change their teaching practices in order to address the issue of effective and equitable science teaching for all students then it is important to consider the autonomy of the PRF and explore ways and means by which change in this can be brought about. This study has shown that teachers' habitus interacts with different ORF resulting producing different degrees of stability within the PRF. From this study it appeared that the teachers at PI to varying degrees had adopted pedagogy that weakened the power differential between the teachers and students. It is difficult at this point to say to what extent this was due to the social class positioning of the students and the influence of the ORF in which the school functioned.

Bernstein has suggested that struggles over the pedagogic device are attempts to control the production and distribution of different pedagogic models (*i.e.,* the rules for the relation, selection, sequencing, pacing and

evaluation of valid school knowledge). Moreover, these struggles over the construction and dissemination of pedagogic models are between different fractions of the middle class. Thus debates over critical or genre approaches to pedagogy (Macken-Horarik, 1998; Martin, 1999), and visible or invisible pedagogies (Cazden, 1995; Delpit, 1997; Rose, 1999) are illustrative of the struggles over the production and dissemination of different pedagogic models within the PRF. Crucially, these are struggles over theories of instruction, that is, models of the: pedagogic subject (students), transmitter (teacher, textbooks, computer), pedagogic context (classroom and curricula organization) and communicative pedagogic competence (modes of teacher and student talk). Bernstein (1990) suggested that changes in the theory of instruction may have 'consequences for the ordering of pedagogic discourse and for the ordering of pedagogic practice.'(Singh, 2002)

Effective science teacher education needs to assist help science teachers to improve their teaching through their lived practice. Teacher education colleges provide a *field* in which is a site at which resources and cultural schema exist dialectically with cultural and social structures: a site at which culture is enacted (Bourdieu, 1993; Sewell, 1999).

> "Cultural capital is knowledge, internalized codes (schema), or cognitive components (resources) equipping social agents to decipher cultural artifacts and relations accumulated through a long process of learning at home, at school, and in society (Bourdieu, 1977). This

definition assists our understanding of how professional education might influence teacher action when we consider the iterative relationship between schemas and resources. Symbolic capital refers to the degree of honor that one might accumulate based on the dialectic between knowledge and recognition. To garner symbolic capital teachers need to convince their peers and instructors that they have the knowledge to support their practice. It is through the process of negotiation that teachers, both consciously and unconsciously, decide on the cultural schema and resources they will appropriate from their professional education experiences to use in other fields, such as science classrooms and schools. Bourdieu reminds us that this negotiation is influenced by the possibilities for generating cultural, symbolic, and social capital. Such an analysis confirms the complexity of this field also illustrated in arguments about the nature of "a highly effective teacher" and how professional education might contribute to the development of these types of teachers (Darling-Hammond, 2002)….

…Professional education should provide opportunities for teachers to develop complex social relationships, to utilize their capital by converting cultural capital to social and symbolic capital, and to explore new resources via authentic tasks/practices (Wenger, 1998). As teachers are involved in these activities individually and socially and

> come to understand their relationship to these activities they will be involved in tinkering with how they construct themselves as science teachers. If the program affords teachers the opportunity to explore new resources and schema that are not part of teachers' dispositions or habitus, then these experiences can expand teachers' options for action, thus transforming teachers' agency and encouraging teacher change." (Milne et al 2006, p: 327-8)

This calls for a change in teacher education in a direction that takes into consideration the complex dimensions of teacher praxis. Praxis is willed action by which a theory or a philosophy becomes a social actuality and by which evaluation of primary experience leads to the development of local theory. Theorizing teaching as praxis allows the recognition of teacher action as purposeful and directed, and draws attention to the tensions that teachers feel when they reflect on their actions (Milne et al, 2006). Teacher action in the classroom is constituted by her agency and structures that constrain or promote possibilities. Teachers' choices about classroom organization, pedagogical styles, and learning activities pointed out to the schemas that constituted an important aspect of their ways of being. Professional education should offer teachers opportunities to change by expanding their options for action and enable them to change the ways in which they carry out their work as science teachers. This means that the process of teacher education should provide spaces for teachers to reflect deeply about their work and contexts and

bring to the surface the deeply ingrained habits of behavior, feeling and thoughts that constitute their habitus (Bourdieu, 1977). Although dispositions are embodied in practice, they are often unconscious and therefore not amenable to self-description or self-fashioning and it is here that the process of teacher education has to create a possibility of a transformative habitus, allowing for change rather than continuity. Effective teacher education programmes would engender the ability of teachers to apply resources and schemas acquired through their participation in the program to the context of their schools and classrooms. Through such programmes teachers would develop dispositions to try out newer pedagogical resources and to critically evaluate the emerging classroom structures in terms of student learning. By offering teachers the opportunity to explore new resources and schema that are not part of their dispositions or habitus, teacher education programmes can expand the teachers 'options for action, increase teachers' agency and encourage teacher 's to bring about changes in the PRF.

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